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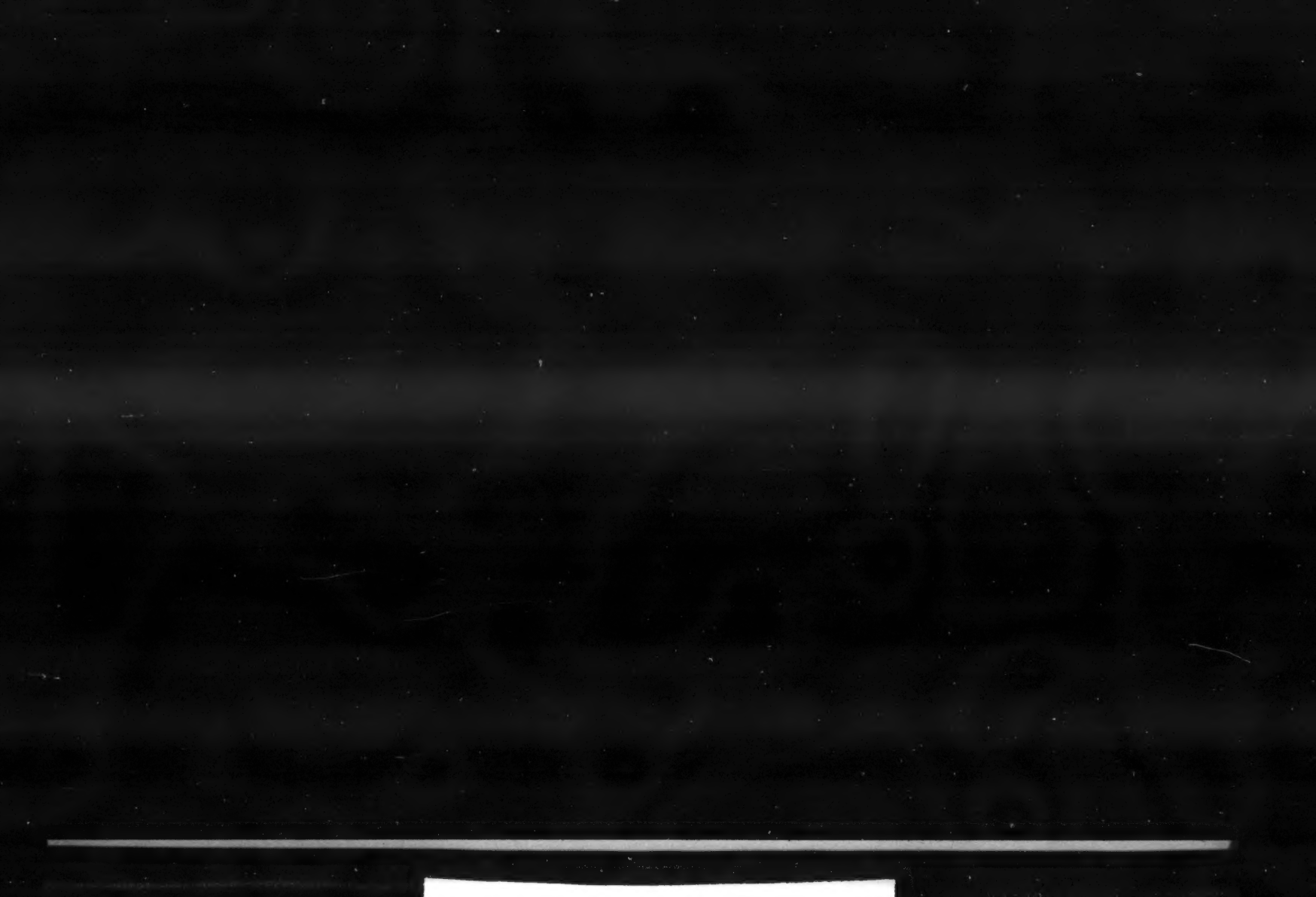

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Ketosis In Dairy Cattle: I. The Role Of Cobalt And The Significance Of Vitamin B_{12} In This Metabolic Disturbance

EDWARD A. WHITE,* D.V.M., M.S., East Lansing, Michigan

THERE are two views, at the present time, concerning the primary cause of the metabolic disturbance in dairy cattle referred to as ketosis, or acetonemia. There are those who feel that basically the disturbance is a failure of the endocrine system, with special attention given to adrenal insufficiency[1,2]. Still others feel that the disturbance arises following a failure on the part of the microflora within the rumen, either as a result of insufficient numbers and/or of their lowered activity, to function adequately[3]. When one considers the clinical picture in its entirety, the proponents of either theory can be considered correct, since both an inadequacy of rumen digestion and temporary endocrine insufficiency may exist. A knowledge of these facts impels one to question which is primary, rumen insufficiency or endocrine insufficiency.

Proponents of the endocrine insufficiency theory have made clear their hypothesis, namely a failure of the pituitary-adrenal endocrine system, and have cited work in support of their theory[4]. Briefly stated, they believe that the heavy strain under which a high-producing cow labors results in exhaustion of the adrenal cortex. Pathology of this portion of the adrenal gland has been demonstrated[5]. Their suggested therapeutic approach has been the administration of cortisone to compensate for the suspected inability of the adrenal cortex to secrete the hormone in quantity sufficient to maintain glycogenesis at a rate equal to the energy needs of the cow[6].

Without further discussion of the hormone insufficiency theory, the remainder of this paper will be given to the evaluation of the theory of inadequate rumen digestion. In order that a background be provided for the discussion and evaluation of this theory, a review of rumen function as now understood follows. This organ, in recent years, has taken on greater and greater importance in the study of digestion. It can be recalled when the rumen was looked upon only as a storage compartment for ingested forage and grains. These feed materials would be held there until regurgitated and masticated later, to be digested, it was thought, further along in the digestive tract, the stomach and intestines. Today the functions of the rumen can be looked upon as being at least twofold, that of a storage compartment, and that of a fermentation vat[7,8]. While the fibrous feed materials ingested by the cow are contained within the rumen-reticulum, bacteria of several kinds and in large numbers, by means of the enzymes they release, effect a breakdown of carbohydrates in the feeds — the sugars, starches, pectins, cellulose, and hemicelluloses. Simultaneously

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with this process, rumen microflora synthesize many nutritious compounds. Some of these have been identified. There are doubtless many others synthesized that have not, as yet, been identified but which may in time be found to be important to the health and productivity of the cow.

A few of the known compounds produced in the rumen during microbial fermentation are the volatile fatty acids: acetic, butyric, and propionic acids[9]. A substantial part of the carbohydrate in the feed is converted to these simple acids which are absorbed from the rumen and are an important source of energy. Propionic acid is antiketogenic and is used in the production of glycogen in the liver. Many

Photo courtesy Dr. J. T. Alston

Doctor Alston called this disorder "palsy after calving." In high producing cows, about 40% of milk fever is complicated by acetonemia.

of the B vitamins including vitamin B_{12}, are synthesized in quantity when rumen digestion is functioning at full capacity[10]. The chief source of protein for the cow probably is derived from the bacterial protein which the microflora of the rumen synthesize.

The Rumen Flora

When mention is made of maximum rumen activity our immediate concern is how to maintain it. The higher the production rate of the cow the greater is the amount of feed which must be digested in the rumen. The rate of rumen digestion is proportional to the numbers and kinds of microorganisms present. It has been said that in every 10 lb. of dried rumen ingesta in a normal cow there is 1 lb. of microorganisms. Putting it in other terms, there are 50 to 100 billion bacteria per gram of fresh rumen contents. Such a vast population of microorganisms must be sustained if rumen fermentation is to be adequate. Rumen microorganisms need certain dietary constituents to enable them to grow and multiply[11]. They require nitrogen for their growth and multiplication. This is derived from feed proteins, from nonprotein nitrogen in feedstuffs; and in addition, from some urea which is recycled from the blood stream into the saliva. In the average quantity of saliva secreted, 10 gallons or more daily by a cow on full feed, there may be 5 to 10 gm. of urea. The rumen microflora needs an adequate source of carbon (carbohydrates), minerals such as calcium and phosphorous, and trace minerals such as sulfur[12] and cobalt. They require nutrients known as growth stimulants, including an unknown growth factor. Most of these essentials are supplied by good quality rations. On many farms, however, cobalt has to be supplied as a supplement to the ration. A lack of cobalt has been found to be the most prevalent mineral deficiency among ruminants[13,14]. Research workers have demonstrated that the character and concentration of the bacterial population of the rumen is markedly changed in cobalt deficiency in sheep[15].

Cobalt as a Supplement to Dextrose for Treatment

With these facts as a background, a practical therapeutic approach to so-called ketosis or acetonemia may be considered; a plan of approach that, likewise, may be employed as a prophylactic in herds, in some areas, that are plagued with this disturbance.

For the past four years, observations have been made following the use of cobalt as a supplement to the intravenous administration of dextrose. The usual dose of 500 cc. of a 50% solution of dextrose is followed by daily doses of 80 to 150 mg. of elemental cobalt orally. A stock solution of cobalt consisting of 1 oz. of cobalt sulfate to 1 gal. of water is prepared for the purpose. One ounce of this stock solution contains approximately 225 mg. of cobalt sulfate. Two to 3 oz. of the solution, adjusted to the level of productivity of the cow, is given daily on the feed or in the drinking water. Since cobalt sulfate contains about 20% elemental cobalt, each ounce of solution is equivalent to approximately 45 mg. of elemental cobalt. Feeding at this level is far below the level of toxicity[16,17]. In the case of complete anorexia, which is quite characteristic in this disturbance, it is often necessary that the cobalt solution be given with a dose syringe or as a drench for a day or two, or until the return of appetite. This method of treatment appears to alter the course of this disturbance in as little time as one to two

days. Appetite increases, ketonuria disappears, and production steadily improves. In cases where there is a lack of response to this method of therapy in two to three days, a careful further clinical examination (urine and blood studies, and possible exploratory laparotomy) has revealed something other than the suspected primary ketosis. As a matter of fact, cobalt therapy, in the face of a confusing clinical picture, often has proved an aid in the differential diagnosis of ketonuria in primary ketosis, and ketonuria in traumatic gastritis or misplaced abomasum. A failure to respond eliminates primary ketosis.

Since cobalt had been so effective as a supplement to dextrose in restoring appetite and removing the symptoms of so-called ketosis, it was reasoned that it might be employed successfully as a prophylactic on the problem farms. Ketosis has been completely eliminated in several such herds in our area by feeding cobalt on a herd basis. Appetite, general physical condition, and milk production have improved at the same time. Studies have been carried on in some of these herds for at least three years.

Knowing that studies had revealed the fact that the bacterial population of the rumen is increased following the administration of cobalt to cobalt-deficient ruminants, it was thought at first that the favorable results obtained in so-called ketosis came about through a more rapid and complete breakdown of crude fiber in the roughage, simply due to the fact that the increased concentration of cobalt in the ration had increased the numbers and activity of the cellulose fermenters. Cellulose fermentation seemed to be involved, since it has been reported that the levels of rumen fatty acids, after fasting, in normal cows were similar to levels obtained in these cows at the time of ketosis[18]. Further research in the field, however, has shown that cellulose fermenters are not affected directly by this trace mineral. In cobalt deficiency, the rate of growth of bacteria appears to be unchanged and there is no apparent loss of efficiency in the fermentation of crude fiber. The apparent accelerated activity on the part of the cellulose breakers following the administration of cobalt, however, can be accounted for in two definite steps: First, it has been demonstrated that the oral administration of cobalt increases rumen synthesis of vitamin B_{12},[19,20] and probably other B vitamins[21] and second, recent work reported by investigators at the Ohio Agricultural Experiment Station indicates that the B vitamins, including B_{12}, supply some essentials that stimulate rumen microflora to higher rates of cellulose digestion[22]. Essentially, a condition of symbiosis exists between the specialized groups of microorganisms within the rumen.

Vitamin B_{12}

Attempting to rationalize still further the part played by cobalt in so-called ketosis, let us consider vitamin B_{12}, each molecule of which contains four parts of cobalt, and see how this vitamin might fit into this picture. There is a basic research at hand to show that vitamin B_{12}, in effect, by functioning in the formation of the methyl group of epinephrine, supplies a stimulus to the medulla of the adrenal gland for the increased production of this hormone within hours after a single injection[23].

Epinephrine elevates the blood sugar by mobilizing the carbohydrate stores in the liver, and partly by encouraging the transformation of muscle glycogen into lactic acid from which the liver manufactures new glycogen. Furthermore, experimental studies indicate that the adrenal medulla, through the secretion of epinephrine assists in regulating the level of blood sugar under conditions of stress.

If one wishes to favor the supposition that the hormone, cortisone, secreted by the cortical layer of the adrenal gland, is active in glycogenesis, we can go one step further. Since there is more epinephrine as a result of vitamin B_{12} synthesis following cobalt administration, there will be more cortisone. This can be explained by the fact that epinephrine plays an important part in bringing about the release of adrenocorticotropic hormone (ACTH) from the anterior pituitary. ACTH, in turn, stimulates the adrenal cortex to greater production of cortisone. Cortisone, in turn, is effective in stimulating glycogenesis by the conversion of fat and protein to fatty acids and glycerol, from which the liver produces glycogen. Biochemically it can not be stated clearly how cortisone effects this transition. Neither is the manner known in which epinephrine produces its effect. There is some evidence that the blood glucose level *per se* influences the activity of the adrenal cortex[24,25]. Outpouring of the adrenal-cortical hormone has been observed to occur rapidly after glucose administration. Herein may lie much of the good that is obtained following dextrose administration. The hyperglycemia produced when dextrose is administered by vein is too transitory to be wholly responsible in itself

for the high percentage (70) of recoveries following a single administration.

No matter what route to glycogenesis is followed, we may conclude that the course of this metabolic disturbance, following the administration of cobalt, has been altered favorably through two important metabolic steps: (1) As a result of increased vitamin B_{12} synthesis by rumen microflora and the attendant accelerated activity of cellulose breakers, there is an increased amount of propionic and acetic acids in the rumen. Liver glycogen is made from propionic acid and from the glucose arising from acetic acid. Thus an important reservoir of glycogen is maintained. (2) As a result of an increased amount of vitamin B_{12} available to the animal, the adrenal medulla and adrenal cortex become more active and there is increased glycogenesis. Rationalization may clearly demonstrate that this disturbance, which we now speak of as ketosis or acetonemia, could well be avitaminosis B_{12}.

An attempt has been made to ascertain the role of vitamin B_{12} clinically in so-called ketosis. In lieu of the dextrose routinely administered intravenously, a large quantity (1 mg.) of vitamin B_{12} has been substituted by the intravenous route. The oral administration of cobalt, namely, 2 to 3 oz. daily of a solution of 1 oz. cobalt sulfate to a gallon of water, was employed as it was following the customary intravenous dextrose therapy.

In the majority of a score or more of cases thus treated, a return to good appetite has been noted in from two to 24 hours. Without benefit of blood assays for vitamin B_{12} previous to and subsequent to its administration, the clinical response is such that one is prone to believe that vitamin B_{12} may play an important role in so-called ketosis. One can conclude further that the favorable results observed following cobalt administration may well be credited to the accelerated synthesis of vitamin B_{12}.

Additional observations and studies are being continued for further data to substantiate the hypothesis that cobalt favorably alters the course of this metabolic disturbance through the accelerated microbial synthesis of vitamin B_{12}, and that this vitamin is the key factor in the prevention of the ketotic syndrome.

Acknowledgment

The writer expresses appreciation to Dr. C. F. Huffman, Dairy Experiment Station, Michigan State College, for his counsel in this study. A word of appreciation is directed to Merck & Company for the B_{12} provided for this study.

REFERENCES

1. Puntriano, Guillermo, Hormonal Hyptothesis of Prepartum and Postpartum Acetonemia in Dairy Cattle. *Vet. Med., Part I*, 46:251 (June), 1951; Part II, 46:301 (Aug.), 1951; Part III, 46:333 (Sept.), 1951.

2. Shaw, J. C., Hatziolos, B. C., Leffel, E. C., Chung, A. C., Gill, W. M., and Gilbert, Janet, Pituitary-Adrenal Cortical Syndrome in Ketosis of Dairy Cows. Maryland Agr. Exp. Station Misc. Pub. 139, 1952.

3. Hoflund, Sven, and Hedstrom, Harry, Disturbances in Rumen Digestion as a Predisposing Factor to the Appearance of Acetonemia. *Cornell Vet.*, 38:405, 1948.

4. Puntriano, Guillermo, Urinary Glucocorticoids as an Indication of Adrenal Dysfunction in Ketosis of Dairy Cattle. *Am. Jour. Vet. Res.*, 13:129, 1952.

5. Shaw, J. C., Hatziolos, B. C., and Leffel, E. C., Studies on Ketosis in Dairy Cattle #15: An Approach to the Etiology of Ketosis in Dairy Cows. Proc. 87th Annual Meeting Am. Vet. Med. Assn., 1950 pp. 73-75.

6. Shaw, J. C., Hatziolos, B. C., Leffel, E. C., Chung, A. C., and Gilbert, Janet, Studies on Ketosis in Dairy Cattle #16: The Pituitary-Adrenal Cortical Syndrome. *N. Am. Vet.*, 34:251, 1953.

7. Baker, F., and Harriss, S. T., Microbial Digestion in the Rumen (and Caecum) with Special Reference to the Decomposition of Structural Cellulose. *Nutrition Astr. and Rev.*, 17:3, 1947.

8. Huffman, C. F., Ruminant Nutrition. *Ann. Rev. Biochem.*, 22:399, 1953.

9. Elsden, S. R., and Phillipson, A. T., Ruminant Digestion. *Ann. Rev. Biochem.*, 17:705, 1948.

10. Huffman, C. F., Physiological Factors Associated with the Utilization of Roughage and Pastures. Paper presented Proc. 41st ann. meeting Am. Soc. An. Production (personal communication), 1949.

11. McNeill, J. J., Doetsch, R. N., and Shaw, J. C., Some Nutritional Requirements of Bovine Rumen Bacteria. *Jour. Dairy Sci.*, 37:81, 1954.

12. Hunt, C. H., Bentley, Orville G., Hershberger, T. V., and Cline, J. H., The Effect of Carbohydrates and Sulfur on B-vitamins Synthesis, Cellulose Digestion, and Urea Utilization by Rumen Microorganisms *in vitro*. *Jour. An. Sci.*, 13:576, 1954.

13. Beeson, K. C., Cobalt: Occurrence in Soils and Forages in Relation to a Nutritional Disorder in Ruminants—A Review of the Literature. Agr. Inf. Bul. 7 (U. S. Dept. Agr. Research Adm., Washington, D. C., 1950).

14. Marston, H. R., Cobalt, Copper and Molybdenum in the Nutrition of Animals and Plants. *Physiol. Rev.*, 32:66, 1952.

15. Gall, L. S., Smith, S. E., and Becker, D. E., Stark, C. N., and Loosli, J. K., Rumen Bacteria in Cobalt Deficient Sheep. *Science*, 109:468, 1949.

16. Dunn, K. M., Ely, R. E., and Huffman, C. F., Alleviation of Cobalt Toxicity in Calves by Methionine Administration. *Jour. An. Sci.*, 11:326, 1952.

17. Ely, R. E., Dunn, K. M., and Huffman, C. F., Cobalt Toxicity in Calves Resulting from High Oral Administration. *Jour. An. Sci.*, 7:239, 1948.

18. Schultz, L. H., Volitile Fatty Acids in the Rumen of Cows with Ketosis. *Jour. Dairy Sci.*, 37:664, 1954.

19. Hale, W. H., Pope, A. L., Phillips, P. H., and Bohstedt, G., The Effect of Cobalt on Vitamin B_{12} Synthesis in the Rumen of Sheep. *Jour. An. Sci.*, 9:414, 1950.

(Continued on page 205)

A Preliminary Report On The Anthelmintic Action Of Piperazine Citrate On *Ascaridia galli* And *Heterakis gallinae* In Hens†

RAYMOND F. SHUMARD,* Ph.D, and DONALD F. EVELETH,*
Ph.D, D.V.M., Fargo, North Dakota

VARIOUS piperazine compounds have been used successfully as anthelmintics. Mouriquand, *et al.*,[1] Standen,[2] and Brown, *et al.*[3] found piperazine hydrochloride to be highly effective against *Aspicularis tetraptera* and *Syphacia obvelata* in mice. Brown and Chan[4] used this compound with some success for the removal of adult *Trichinella spiralis* from mice. They also reported successful treatment of *Enterobius vermicularis* in man. Brown and Sterman[5] had considerable success using piperazine citrate for the removal of *Ascaris lumbricoides* from man.

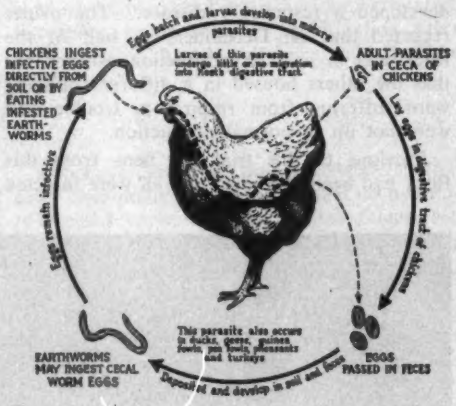
Leiper[6] used infected domestic hens as *in vivo* test animals for screening piperazine compounds and stated that piperazine and certain piperazine compounds were effective in removing Ascaridia and, to a lesser extent, Capillaria and Heterakis. Using polymeric piperazine-1-carbodithiodic acid, he reported the successful removal of Ascaris and Oesophagostomum from pigs.

Laboratory Trials

Sixteen White Leghorn hens obtained from the flock to be described in the field trial were placed in cages in the laboratory and fed identical rations. Fecal examinations of the hens were all positive for Ascaridia and Heterakis ova.

Piperazine citrate, in a concentration of 8,000 mg. per gallon of drinking water, was given to 12 of the hens. Three had access to the medicated water for one day, three for two days, three for three days, and three for four days. One hen was given 16,000 mg. piperazine citrate per gallon of drinking water for four days. The two remaining hens served as controls and were given non-medicated water. All of the hens were killed on the seventh day and examined for worms. No Ascaridia could be found in any of the medicated hens. One of the control hens had no Ascaridia present, the other had eight.

Life Cycle of the Cecal Worm (Heterakis gallinae) of Poultry


Eggs hatch and larvae develop into mature parasites
CHICKENS INGEST INFECTIVE EGGS DIRECTLY FROM SOIL OR BY EATING INFESTED EARTH-WORMS
Larvae of this parasite undergo little or no migration into host's digestive tract.
ADULT PARASITES IN CECA OF CHICKENS
Lay eggs in digestive tract of chickens
Eggs reach infective
This parasite also occurs in ducks, geese, guinea fowls, pea fowls, pheasants and turkeys
EARTHWORMS MAY INGEST CECAL WORM EGGS
Deposit and develop in soil and feces
EGGS PASSED IN FECES

Courtesy Illinois Univ. Dept. Vet. Res., Cir. 698.

Of the hens treated with 8,000 mg. piperazine citrate per gallon of water, the following still harbored Heterakis: One treated for one day; all treated for two days; none treated for three days; and one treated for four days.

The hen treated with 16,000 mg. for four days was negative for Heterakis while both controls still harbored these worms.

†Part of a cooperative project between the Agricultural Experiment Station, North Dakota Agricultural College and the Animal Disease and Parasite Research Branch, Agricultural Research Service, U.S.D.A.

*Department of Veterinary Science, North Dakota Agricultural College.

Published with the permission of the director, Agricultural Experiment Station, Fargo, North Dakota.

Acknowledgment is made to E. R. Squibb & Sons, New York for furnishing the piperazine citrate.

Field Trial

On December 6, 1954, a client medicated the drinking water for his flock of 750 White Leghorn hens with piperazine citrate at a concentration of 10,000 mg. per gallon of water. He reported that the next morning there were numerous ascarids on the dropping boards under the roosts. He continued medication December 7 and 8, and on December 13 submitted two birds for examination. Both were negative for Ascaridia and Heterakis. On December 23, the client submitted 12 additional birds. All were negative for Ascaridia, seven were positive for Heterakis on postmortem examination.

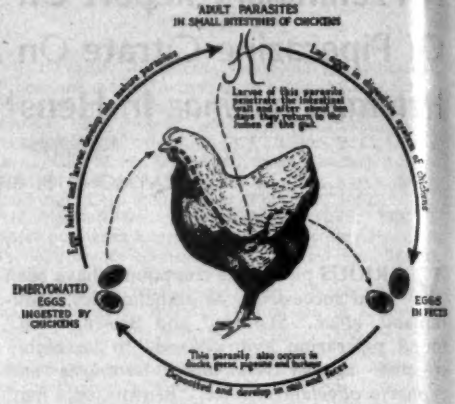
The egg production was as follows:

December 6 (day of treatment)	450
December 8	360
December 9	370
December 12	415

These data suggest that the treatment may have had a deleterious effect on egg production, however, at the time of treatment, the birds were heavily infested with mites and had developed a respiratory disease. The owner reported that on December 23, half of the flock was in as high production as ever but that the others housed in a different building were suffering from respiratory trouble and were not up to normal production.

Previous to this trial, 16 hens from this flock had been examined and all were infected with Ascaridia and Heterakis. Of these examinations, 14 were positive by fecal examinations, while two were examined postmortem.

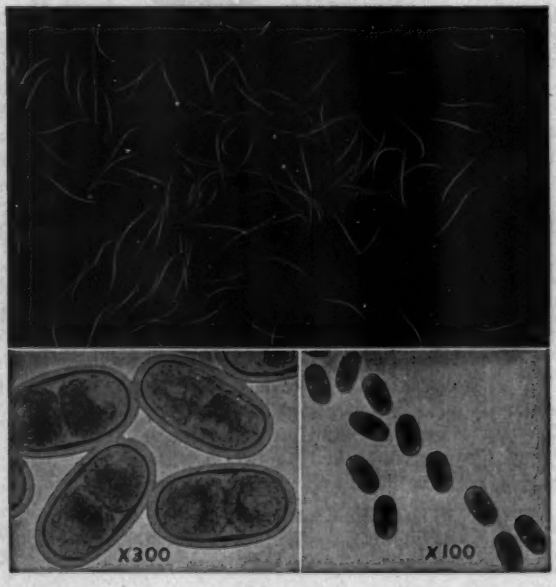
Life Cycle of the Roundworm (Ascaridia galli) of Poultry



Courtesy Illinois Univ. Dept. Vet. Res., Cir. 698.

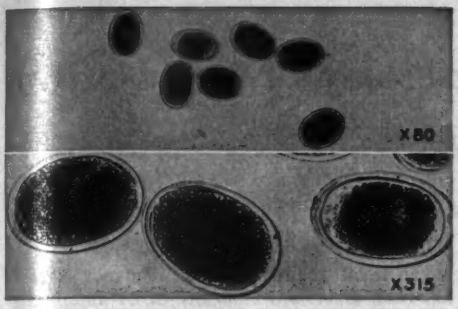
Summary

Laboratory trials and a field trial have been conducted using piperazine citrate in drinking water as an anthelmintic in chickens. The treatment at all of the levels was 100% effective against *Ascaridia galli* and less effective



Adult worm (natural size), Heterakis gallinae, cecal worm of fowls. Magnification as indicated for ova.

Courtesy Illinois Univ.
Dept. Vet. Res., Cir. 698.



Courtesy Illinois Univ. Dept. Vet. Res., Cir. 608.

Eggs of Ascaridia galli, common large roundworm of poultry, at two magnifications as indicated.

against *Heterakis gallinae*. Three days of treatment in the field with a concentration of 10,000 mg. piperazine citrate per gallon of water appeared to be 100% effective against ascarids, but not as effective against cecal worms.

REFERENCES

1. Mouriquand, G., Roman, E., and Coisnard, J., Analysis of Treatment of Oxyuriasis with Piperazine. *Le Jour. de Medicine de Lyon*, 32:189, 1951.

2. Standen, O. D., Experimental Chemotherapy of Oxyuriasis. *Brit. Med. Jour.*, 2:757, 1953.

3. Brown, H. W., Chan, K. F., and Hussey, K. L., The Efficacy of Piperazine Compounds Against *Syphacia obvelata*, a Pinworm of Mice. *Am. Jour. Trop. Med. & Hyg.*, 3:504, 1954.

4. Chan, K. F., and Brown, H. W., Treatment of Experimental Trichinosis in Mice with Piperazine Hydrochloride. *Am. Jour. Trop. Med. & Hyg.*, 3:746, 1954.

5. Brown, H. W., and Sterman, M. M., Treatment of *Ascaris lumbricoides* Infections with Piperazine Citrate. *Am. Jour. Trop. Med. & Hyg.*, 3:751, 1954.

6. Leiper, J. W. G., The Piperazine Compound V.19 for the Removal of Ascaris and Oesophagostomum from the Pig. *Vet. Rec.*, 66:596, 1954.

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Field Preparation of Vaccine

We have been told by a veterinarian, having extensive experience in handling contagious and infectious diseases of animals in some of the Asiatic countries, that because of the lack of ample refrigerating equipment it is practically impossible to preserve some veterinary vaccines in full potency. In the case of the rabbit-passage, attenuated, hog cholera virus, for example, the rabbit is inoculated with the virus in the usual method of preparing this attenuated vaccine and then taken to the field of operation where it is killed and its whole blood used as the immunizing material.

Treatment of Human Brucellosis

Classified under Queries and Minor Notes (*Jour. A. M. A.*, Mar. 26, 1955) recommendations are made for medical management of members of a family known to have had contact with Brucella infected cows and who drank raw milk from infected individuals.

It was recommended that seroagglutination tests and blood culture studies be made on all members of the family since asymptomatic persons may reveal positive blood cultures or Brucella agglutinins. When diagnosis of brucellosis was established in the one member exhibiting suggestive symptoms, it was recommended that treatment be begun immediately with combination of dihydrostreptomycin and tetracycline. Dose for adults is 1 gm. of dihydrostreptomycin twice daily for seven days and one half this dose for the second seven-day period. Simultaneously, 0.5 gm. of a tetracycline drug is recommended four times daily, orally, for a total of three weeks.

It is recommended that asymptomatic persons whose blood culture is positive be treated, but those giving positive agglutination titers and negative blood culture should not be treated.

▼ ▼ ▼

Extensive research on rickettsial spotted fever over many years has revealed no naturally-infected animals in the United States. No known reservoir has existed other than the tick vector.

▼ ▼ ▼

Ketosis in Dairy Cattle

(Continued from page 202)

20. *Ibid*, The B Vitamins in Relation to Cobalt Deficiency in the Sheep. *Jour. An. Sci.*, 9:484, 1950.

21. Smith, S. E., Koch, B. A., and Turk, K. L., The Response of Cobalt Deficient Lambs to Liver Extract and Vitamin B_{12}. *Jour. Nut.*, 44:455, 1951.

22. Bentley, Orville G., Johnson, Ronald R., Vanecko, Steve, and Hunt, C. H., Studies on Factors Needed by Rumen Microorganisms for Cellulose Digestion *in vitro*. *Jour. An. Sci.*, 13:581, 1954.

23. D'Iorio, Antinone, and Plant, O. W. E., Effects of Thyrotoxic Materials and Vitamin B_{12} in the Epinephrine Content of Adrenals. *Arch. Biochem. & Biophys.*, 41:153, 1952.

24. Steeples, G. L. Jr., and Jensen, H., Effect of the Blood Glucose Level on the Secretion of the Adrenal Cortex. *Am. Jour. Physiol.*, 157:418, 1949.

25. Abelin, I., Zur Frage der Betciligung der Nebenniere am Zuckerstoffwechsel. *Helv. Physiol. Pharmacal., Acta*, 3.

Pregnancy Disease In Sheep: Study Of Prophylaxis And Treatment On Flock Basis†

H. H. BERRIER, JR*., B.S., D.V.M., Columbia, Missouri

THE following is a summary of cases involving flocks of ewes under treatment for pregnancy disease during the winter of 1954**. The products used were cortisone acetate and ketogestin®.

Of six flocks totaling 123 ewes, 45 were ketonuria positive, ranging from 1 plus to 4 plus (4 plus = strongest or very dark color reaction.)

Of the 45 reactors, 13 died. Of these, only three exhibited typical symptoms without complications; three were complicated by pyometra following lambing and one with both pyometra and emphysematous dead twins. Another relapsed following cessation of treatment and died without further treatment, and two died in labor. One light reactor (1 plus) died from an infected puncture wound in the foot, another similar reactor died without exhibiting symptoms of pregnancy disease, and the last died from pneumonia following lambing.

Discussion

On the basis of flock management and treatment, when pregnancy disease was diagnosed, it is the writer's opinion that cortisone acetate and ketogestin played an important part in carrying through lambing many reactors which would have died without treatment.

Because of required repeat calls and injections a satisfactory prophylaxis and treatment has not been perfected. If an adrenal corticotropic hormone could be produced economically enough in powder form for dispensing purposes, it might prove a near-ideal prophylaxis. Such a powder, to be sprinkled on or mixed into the daily feed, should be a great aid in flock treatment when pregnancy disease has been diagnosed clinically or by autopsy.

Ewes exhibiting clinical symptoms need individual treatment with therapeutic doses and other supportive treatment *e.g.*, intravenous or intraperitoneal injections consisting each of 500 cc. of a combination of 5% dextrose and 5% injectable amino acids in physiological saline. With the use of parenteral fluid and electrolyte (physiological saline) therapy, acidosis, dehydration, and chloride loss may be minimized. Possible use of sodium propionate or sodium acetate *per os* may assist in increasing blood sugar and help counteract excessive blood ketone bodies[1].

Appetite may be stimulated by the use of rumen inoculation capsules, concentrated multiple vitamins, et cetera. In addition to prophylaxis, the clinician should make recommendations to the breeder regarding corrective feeding and management of the remainder of his flock[1].

It would appear that whether or not a ewe exhibiting symptoms responds favorably to therapy depends, in part, upon the extent of liver damage *i.e.*, if the condition has a sudden onset and there is little pathological change, therapy will stimulate recovery. If the condition has had a gradual onset, the functional portion of the liver has been able to compensate for its gradually increasing damage. When the breaking point is reached, the ewe exhibits clinical symptoms. By this time the liver has so completely undergone fatty metamorphosis that little or none of it is functional. Unless this ewe gives birth she will be unable to respond favorably to any therapy.

Pregnancy disease appears to be the result of a "stress enigma". According to work done by Selye, Sylvester, Hall and Leblond, Montreal, Canada,[2] when an animal is subjected to stress there is an alarm reaction. The pituitary gland pours out hormones which stimulate the adrenal glands to pour out others. It is well known that during the stress of

(Continued on page 209)

†Journal series No. 1506, Missouri Agricultural Experiment Station, School of Veterinary Medicine, University of Missouri, Columbia.

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**The author gratefully acknowledges help given by Dr. Cecil Elder, head, Department of Veterinary Pathology, School of Veterinary Medicine, University of Missouri, in writing this article, and for autopsy reports submitted by Dr. L. D. Kintner, assistant professor, Veterinary Pathology, School of Veterinary Medicine, University of Missouri.

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The Veterinary Diagnostic Laboratory†

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THE laboratory to be described is one idea of an ideal set-up. No such institution presently operating in the country is known to the author, although there may be one, as a laboratory of this type is entirely practical. Such an organization would require close cooperation from the state veterinarian, state university officials, the state health department, farm organizations, and practicing veterinarians. The primary aim of a diagnostic laboratory is to make available to practicing veterinarians the complicated laboratory tests needed to establish a diagnosis in some cases.

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By establishing rapid, accurate diagnosis in obscure cases, prompt specific treatment can be given, and animals and money saved that otherwise would be lost. Thus, the veterinary diagnostic laboratory is seen to be the counterpart of the diagnostic laboratory of the state health department.

Staff and Types of Service

The types of service offered by the laboratory necessarily will be limited by the training, number of men, and facilities available. All of these should be adequate to deal with animal diseases, occurring in the state, that require laboratory diagnosis.

The staff of the laboratory should be directed by a veterinarian who is familiar with both clinical and laboratory veterinary medicine. Such an individual will have an appreciation of the problems faced by the farmer, the practitioner, and the laboratory workers, and be able to coordinate the work of the various specialists in order to assure the best possible service.

Autopsies are the origin and basis of much of the diagnostic work. The work of the laboratory will be more valuable if only live, sick animals are accepted for examination. Such specimens are much more satisfactory for all types of laboratory examinations and the results much more reliable. The practitioner in the field can do just as good a job with the autopsy of a dead animal as can be done in the laboratory. Therefore, when possible, only live animals, near death, should be referred.

Sufficient numbers of veterinarians to handle the volume of work should be on the staff. These men should have whatever special training is necessary to do autopsies (including poultry), pathology, hematology, and bacteriology-virology work.

Examinations of organs from autopsied animals for bacteria, viruses, and fungi, of blood or milk samples, or of other specimens properly prepared and mailed in, are an integral part of the diagnostic laboratory service.

A laboratory animal colony should be available for inoculations for diagnosis of infectious diseases or for feeding trials in cases of suspected poisonings. In some cases, it may be more desirable to use hogs, cattle, or poultry for these purposes and such animals and facilities for handling them should be available. Veterinary bacteriologists and virologists will be required for this work.

Microscopic examination of tissues, including tumors, often will furnish information of diagnostic value. A veterinary pathologist to handle this specialized work will be needed

†From a paper presented to the Florida Veterinary Medical Association, West Palm Beach, October 27-28, 1952.

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on the staff. Blood counts of various sorts can be carried out under the supervision of this scientist.

The examination of the blood serum of animals for evidence of infection is an important part of diagnostic laboratory work. Such tests are the basis for disease control programs such as brucellosis of cattle and swine or pullorum disease of poultry. Programs could be developed in cooperation with the state veterinarian's office to test the same cattle blood samples submitted for brucellosis for leptospirosis, vibriosis, and anaplasmosis.

A toxicology service with a properly trained biochemist should be part of the laboratory. This type of service is generally lacking in veterinary medicine. However, with the increased use of chemicals and insecticides and the ever-present plant poisonings, animal toxicosis is now an important cause of deaths. The many tests in the field of blood chemistry could be conducted conveniently in this department.

Parasitism is costly to the raisers of all types of livestock. A parasitologist should be on the staff to deal with cases of this type.

Each of the scientists assigned should have enough trained technicians to assist with the work. In addition, secretarial workers, animal caretakers, and laborers must be available.

Other Uses of a Diagnostic Laboratory

1. A veterinary diagnostic laboratory can serve as a new or unusual disease-detection center. To cite an example, a Florida veterinarian, in conjunction with the state veterinarian's office, recently assisted one diagnostic laboratory in its study of moldy corn poisoning of swine. These veterinarians recognized a new condition and called the problem to the attention of the laboratory. Largely through information furnished by them it was possible to incriminate moldy corn as the cause of this newly recognized disease.

As an example of unusual diseases, leptospirosis of cattle and swine may be cited. This disease, which had not been seen previously in the area, was called to the attention of a southern diagnostic laboratory by a veterinarian. Examination of the herd confirmed the presence of an unusual disease which, after several tests, was proved to be leptospirosis.

2. A diagnostic laboratory can serve as a center for the dissemination of information on diseases coming to its attention. Such information can be distributed to the practitioners and farmers in the state through bulletins, newspaper articles, mimeographed papers, or articles in professional journals. One laboratory writes a column for the Veterinary Medical Association Bulletin of the state where it is located acquainting practitioners with current work and observations. More detailed information is written up on the more interesting or unusual cases. Some Midwestern veterinary science departments issue a newsletter.

The library at the diagnostic laboratory can serve as a source of information for practitioners. Telephone consultation service could be offered and thereby references to a complete library of information. The laboratory staff also can cooperate with state veterinary association committees, state health department personnel, and other organizations in furnishing information desired. Consultation on animal disease control practices can be held with farmers visiting the laboratory.

3. Another way in which the diagnostic laboratory can assist practitioners is in furnishing refresher courses for them in states where they are not offered by other agencies. Special short courses such as those concerned with infertility of cattle and in poultry diseases can be arranged by the laboratory as needed. It has been found of value to practitioners to refresh themselves on certain laboratory tests that may be useful in their own office laboratories including blood counts, toxicological tests, bacteriological examinations, and other technics.

4. A field consultation service can be supplied to the practicing veterinarian in selected cases. These should be confined to serious outbreaks of disease in large numbers of especially valuable animals.

5. The diagnostic laboratory can serve as part of a disease control program in cooperation with the state veterinarian or the state health department. The mastitis control program as operated by the state of New York and the swine brucellosis control program in Iowa are good examples of this type of service.

6. Short term research projects of a diagnostic nature can be carried out by the laboratory if facilities are available. An example already referred to was the moldy corn poisoning incident. In this case, corn referred to the laboratory was ground and fed to pigs through a stomach tube and the disease reproduced. The identification of hog cholera virus, especially variants, can be carried out by the laboratory if sufficient space, help, and money are available. It should be stressed that ade-

quate facilities including necessary equipment and an isolation unit building are essential for this type of service.

In addition, new diagnostic tests, preferably ones that can be used in the field, can be developed as research projects.

Budget and Physical Plant

It should be obvious that such an organization will require a large budget in order to be able to carry out the extensive program of work in support of the livestock industry and practicing veterinarians. In 1952, one Midwestern veterinary science department (not a veterinary school) had an annual budget of $300,000. The staff included 19 veterinarians. Other specialists, technicians, and laborers increased the size of the staff to 50 individuals.

Adequate physical facilities including laboratory buildings, isolation units, outside holding pens, and the necessary housing for tools, machinery, and other equipment are essential. The location of the laboratory is important in that it should be centrally located and easily accessible by several types of transportation. It should be near a large institution, preferably the state university, to facilitate consultation with allied specialists when essential or advantageous. It should be near medical library facilities, in order to avoid excessive costs incident to a department library.

The services of the animal disease diagnostic laboratory should be available to the public through the local practicing veterinarian just as the services of state health departments are available through the practicing physician. There are several advantages to operating in this way:

1. The time and efforts of the staff of the diagnostic laboratory can be conserved for cases that need laboratory assistance for diagnosis. In this way the veterinarian will be able to eliminate cases that are obvious to the trained professional eye and not take up the time of the personnel of the diagnostic laboratory with the performance of expensive, time-consuming laboratory tests that are not actually required.

2. Veterinary medicine on a local basis is centralized in the best qualified persons in the community for advising on the treatment of animals or the prevention of diseases to which they are subject.

In this connection, it should be stated that the function of the diagnostic laboratory is only to perform laboratory tests, the results of which are furnished to practicing veterinarians. He interprets the results of the tests in the light of his knowledge of the conditions on the farm and in the community, symptoms shown by the animals, and history of the herd. It is not possible for people in a laboratory, miles from the farm, to recommend treatment that is both practical and proper as readily as the practitioner who has the facts of local conditions at his command. Nor can laboratory personnel be expected to be as skilled in the art of treating sick animals as are practicing veterinarians who spend a large portion of their time in that endeavor.

3. The taint of socialized veterinary medicine can be avoided if the diagnostic laboratory, a state-owned and operated institution, is not put into the position of directly competing with local private practicing veterinarians, essential individuals to the livestock industry, who are earning their living by making their services available to their communities.

Many states are in the process of setting up animal disease diagnostic and research laboratories. It is hoped that the above will be useful in assisting administrative personnel in these states to appreciate the scope and magnitude for service of a good laboratory.

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Pregnancy Disease in Sheep

(Continued from page 206)

pregnancy disease, activity of the pituitary gland is increased and the adrenal glands are enlarged, reaching their peak near parturition[1].

If stress continues, the alarm reaction is followed by a period of adaptation (the compensation referred to previously) during which the animal has been able to live with its stress. Eventually, however, the defense mechanism wears out, the breaking point (referred to previously) is reached and the animal sickens and dies[2].

REFERENCES

1. Berrier, H. H., Jr., Pregnancy Disease In Sheep: A Preliminary Report on Prophylaxis and Treatment. *Vet. Med.*, 48:405 (Oct.), 1953.

2. Selye, Hans, Sylvester, Octavia, Hall, C. E., and Leblond, C. P., Hormonal Production of Arthritis. *Jour. Am. Med. Assn.*, 124:201, 1944.

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Australian workers recommend 60 cc. of 10% sodium bicarbonate solution ($NaHCO_3$) for effecting closure of the esophageal groove prior to treatment of cattle for intestinal parasites.

Toxicity Of *Aspergillus Fumigatus* Substrates To Animals

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RECENT findings have shown that substrates on which various fungi had been cultured are toxic to animals. Carll and coworkers[1,2] demonstrated acute and chronic toxic symptoms and subsequent death in calves that had ingested substrate on which a strain of *Aspergillus chevalieri* had been cultured. According to Forgacs *et al.*[3,4] substrates on which a strain of *A. clavatus* had been cultured, when fed, produced acute and chronic toxic symptoms in calves, acute toxic symptoms in mice, and subsequent death in both species. The *A. chevalieri* and *A. clavatus* had been isolated from hyperkeratosis-producing cattle feedstuffs. Sippel, Burnside, and Atwood[5] found moldy corn toxic to swine and cattle. Recent information[6] indicates that two fungi, an unidentified species of Aspergillus and a strain of *Penicillium rubrum*, were responsible for toxicity. Levitskii and Koniukhova[7] called attention to toxicity of various fungi and their substrates. Four species of Aspergilli — *A. fumigatus, A. flavus, A. nidulans,* and *A. niger* were toxic to rabbits. These authors reviewed work of other investigators who found that substrates on which fungi belonging to the Penicillium, Aspergillus, and Rhizopus genera, when cultured in liquid and solid culture media and on fodder, and fed, produced death in swine, rabbits, guinea pigs, and ducks 30 to 40 days after feeding.

Studies were conducted to test ether extracts of corn previously inoculated with an albino strain of *A. fumigatus* for dermal toxicity in the rabbit, calf, and horse, and for oral toxicity in the horse and calf. Oral toxicity of unextracted, inoculated corn also was determined in the calf. This Aspergillus was selected for study because a preliminary test showed that ether extracts of corn on which this fungus had been cultured produced a pronounced dermal inflammatory reaction on a rabbit.

Methods and Results

1. *Dermal Toxicity of Ether Extract.* Sterile, whole grain corn on which the Aspergillus had been cultured statically for approximately 15 days at 30 C. was extracted continuously for four hours with anhydrous ethyl-ether in a Soxhlet apparatus. The weight of extractable substance present in the ether was determined, olive oil added, and the ether evaporated under reduced pressure. The suspension was diluted further and tested for dermal and oral toxicity.

Approximately 0.432 gm. of ether-extractable material suspended in 0.75 ml. of olive oil was applied topically on a shaved area on the back of each of three rabbits for three consecutive days. Twenty-four hours after the first dose, hyperemia, edema, and increased sensitivity at the site of application were observed. The reaction became more pronounced after the second dose. One day after the last dose, the inflammed area became necrotic, more edematous, and showed an abundance of serum leakage.

The horse and calf received 2.3 gm. of ether-extractable substance suspended in olive oil in one 10 ml. dose and six 5 ml. doses applied on an unshaved area of the neck (8 x 15 in.) over a seven-day period. Twenty-four hours after the first dose, an acute inflammatory reaction was observed, characterized by hyperemia, edema, parallel skin folding, and increased sensitivity. Lacrimation was profuse and abundant in the calf, whereas it was only moderate in the horse. Appetite was not impaired in either species, but the calf exhibited pronounced cachexia and progressively lost approximately 25% of its body weight while on a high type feeder ration. Although the horse demonstrated no abnormalities in the cellular blood picture, the calf showed a definite agranulocytosis. The white cell count dropped to 2,150 and the differential showed 96% lymphocytes, 2% filaments, and 2% bands. The pulse, which was hard and stringy in the calf, increased to 96 per minute, respirations to 100 per minute, and the temperature to 106 F. The calf gradually returned to normal after termination of exposure.

2. *Oral Toxicity of Ether Extracts and Substrate.* Ether extract obtained from corn in which the *A. fumigatus* had been cultured was tested for oral toxicity in the horse and calf. A horse was fed by stomach tube 2,025 ml. of an olive oil suspension containing 166 gm. of ether-extractable material over a period of 20 days. During this period, and for the next five successive days, the animal showed only signs of slight depression and lacrimation. A calf fed by the same route, 3,275 ml. of olive ether-extractable material in 3,275 ml. of olive oil over a period of 33 days, displayed the same symptoms as observed in the horse.

On the presumption that the olive oil might have interferred with toxicity of the extracts, nonextracted, inoculated corn subsequently was fed to the calf used in the preceding experiment. The animal received, by stomach tube, 23.8 lb. of ground corn suspended in water over a period of 13 days. Three days after the start of the feeding period, the animal exhibited depression and lacrimation. Subsequently, the calf exhibited a progressive toxemia, characterized by profuse lacrimation, prostration, complete anorexia, fetid diarrhea, and gross dehydration. The animal died on the seventh day following the last feeding.

Gross autopsy findings included liver and kidney changes with hemorrhages in the omentum, mesentery, lungs, and the superficial muscles over the thorax, blood-tinted material in the lumen of the small intestine, and depletion of the cortical lipoids in the adrenals.

On histological examination, the following conditions were observed: Hemorrhages and congestion in the cortex and slight dilation and epithelial degeneration in the tubules of the kidneys (in some areas, the epithelium of the tubules had separated from the basement membrane and appeared as tubular epithelial casts) hemorrhages and congestion and areas of focal necrosis, thrombii in the hepatic veins, and congestion of the sinusoids in the liver; edema of the submucosal tissue of the gall bladder; congestion and capillary hemorrhages in the mucosa of the omasum and small intestine; hemorrhages in the submucosa of the trachea; congestion, edema, hemorrhages, atelectasis, and bronchial pneumonia in the lungs, and congestion and hyperplasia in the mediastinal, intestinal, and hepatic lymph nodes. Long, rod-shaped bacteria occurring singly, doubly, and in chains were seen in the heart, liver, kidneys, and adrenals. Mycological examination of tissues revealed the presence of the *A. fumigatus* only in the digestive tract.

Discussion

Ether extract from corn on which the *A. fumigatus* had been cultured was dermally toxic to the rabbit, calf, and horse. The syndrome, characterized by hyperemia, edema, and subsequent necrosis observed in the three animal species resembles dermal reactions observed by Carll *et al.*[3,4] and Forgacs and coworkers[5,6] in rabbits and calves tested with similar extracts prepared from substrates on which a strain of *A. chevalieri* and *A. clavatus* had been cultured, and as reported by Gorlenko[9] in rabbits tested with ether extracts from a variety of fungi, indicating that production of dermally toxic substances may occur among many fungi.

The *A. fumigatus* extract, when suspended in olive oil and fed to calves, produced only slight depression and lacrimation, confirming our earlier findings with other fungal extract[8]. Either the oil inhibited absorption of the toxic substance during passage through the digestive tract, or there was insufficient toxic substance present in the oily suspension to produce systemic toxicity, or the dermally toxic substance and the orally toxic factor may be separate entities. Nevertheless, the results confirm observations made by various workers[1,4,5,9] indicating a direct relationship between dermal toxicity of ether extracts and oral toxicity of substrates on which fungi had been cultured.

Importance of toxic fungi in human and veterinary medicine in the United States, in the past, has not been realized entirely; nevertheless, sufficient information has been obtained during the past four years to warrant more intensive study of mycotoxicoses. Although the *A. fumigatus* used in our investigations was not isolated from a toxic feedstuff, Thom and Raper[10] state that members of the *A. fumigatus* group of fungi are widespread and occur, among other substrates, on imperfectly dried, stored grains. Members of this group are capable of growing over a wide temperature range, even at 45-50 C. where most fungi cannot grow. It is reasonable to assume that fungi belonging to this group may be responsible for toxicoses heretofore of unknown etiology.

Summary

The rabbit, calf, and horse tested topically with ether extracts from corn on which a strain of *Aspergillus fumigatus* had been cultured developed hyperemia, edema, and subsequent necrosis. A horse and calf fed the

dermally-toxic extract suspended in olive oil developed only slight depression and lacrimation.

Corn on which the fungus had been cultured produced acute toxic symptoms characterized by lacrimation, salivation, depression, increased respiration, anorexia, fetid diarrhea, congestion, and subsequent death. Gross and histopathological examination revealed atelectasis, congestion and hemorrhages in liver, kidneys, adrenal, abomasum, small intestine, cecum, lungs, heart, and mucosa of the trachea.

REFERENCES

1. Carll, W. T., Forgacs, J., and Herring, A. S., Toxic Aspergilli Isolated from a Food Concentrate. *Vet. Med.*, 48:324, 1953.
2. Carll, W. T., Forgacs, J., and Herring, A. S., Toxicity of Fungi Isolated from a Food Concentrate. *Am. Jour. Hyg.*, 60: 1954.
3. Forgacs, J., Carll, W. T., Herring, A. S., and Mahlandt, B. G., A Toxic Fungus Isolated from Feed Pellets. *Vet. Med.*, 68:410, 1953.
4. Forgacs, J., Carll, W. T., Herring, A. S., and Mahlandt, B. G., A Toxic *Aspergillus clavatus* Isolated from Feed Pellets. *Am. Jour. Hyg.*, 60: 1954.
5. Sippel, W. L., Burnside, J. E., and Atwood, M. B., A Disease of Swine and Cattle Caused by Eating Molded Corn. Proc. Am. Vet. Med. Assn., 1953, pp. 174-181.
6. Unpublished data.
7. Levitskii, B. G., and Konukhova, V. B., On the Toxicity of Feed Contaminated with Common Fungi. *Veterinariia*, 24:40, 1947.
8. Gorlenko, M. V., Toxins of Molds. *Am. Rev. Sov. Med.*, 5:163, 1948.
9. Thom, C., and Raper, K. B., A Manual of the Aspergilli. Baltimore, Williams and Wilkins Co., 1954.

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Coughing is the main diagnostic feature of virus pneumonia in swine. There are certain other conditions, including lungworm infection, that produce similar symptoms. Some breeders also believe that ascarid infection causes coughing. To make certain of our ground, pigs were inoculated with ascarid larvae to determine if pneumonia could be produced. These animals did develop hemorrhages in the lungs and areas of inflammation but nothing of the same sort that one finds with virus pneumonia. In some instances dry feeds also are blamed for coughing. The virus pneumonia cough is characteristic. It is a rather prolonged, hacking sort of coughing spasm that shakes the pig's body. — *W. I. B. Beveridge, M.R.C.V.S.*

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Radiation of whole milk may make possible longtime freshness in this product and, if sterilizing procedures prove practical, present day marketing practices may be revolutionized.

Copper Sulfate for Trichomoniasis of Pigeons

Copper sulfate ($CuSO_4$:5 H_2O) is in common use as a treatment for trichomoniasis of pigeons but reports on critical tests are rare. Jaquette (*Am. Jour. Vet. Res.*, 9:206, 1948) has tested the efficacy of this chemical in the elimination of subclinical infection from pigeons. The most effective concentration tested in nonbreeding pigeons was 100 mg. of the drug per 100 cc. of water. For breeding pigeons, 35 mg. per 100 cc. water was the most effective concentration that could be used without producing toxicity. The treated drinking water was kept before the birds continuously for 20 days. Approximately 85% of the pigeons treated by these two methods completely eliminated the parasites, as determined by a series of direct smear examinations of upper digestive tract contents.

Concentrations of the drug greater than 100 mg. per 100 cc. of solution for nonbreeders proved toxic. The toxic manifestations were depression, loss in weight, and possible liver damage. The reason for the marked difference in concentration of treated drinking water for the nonbreeders and breeders is the former consumed an average of 134 cc. of treated water, while the latter, which were feeding young squabs, consumed an average of 568 cc. Breeders waste considerable water in feeding squabs so the actual amount of drug obtained by each group was not as great as is indicated by the consumption rates.

Jaquette emphasizes that treatment of Trichomonas carriers by treatment with copper sulfate is possible only if the pigeons freed of infection are segregated. Since such freed pigeons are still susceptible, they must be well segregated and strict sanitary measures instituted to prevent reinfection. If this can be done, it will be possible to produce and keep squabs free of the disease. It is only by repeated microscopic examination of upper digestive tract contents that one can be assured that pigeons are free of the parasite. Direct smears have proved satisfactory for this purpose, if several negative ones are found over a period of several weeks.—*W. R. Hinshaw, D.V.M.*

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Dwarfism in Beef Cattle

Dwarfism is known to be a matter of inheritance following Mendel's law. The need is for a reliable method of identifying carriers of recessive genes.

Electrophoretic Determination Of The Immunological Response Of Swine To Hog Cholera†*

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COMPARATIVELY little data are available concerning the electrophoretic analysis of swine sera, particularly with respect to the immunological response of swine. Studying the plasma constituents of the developing pig embryo Moore, Shen and Alexander[3] showed changes in type and amount of proteins. While no gamma globulin was found in the early embryonic stages, a small amount of protein migrating at the same rate as adult swine gamma globulin was observed in the 300 mm. embryos. In this laboratory no gamma globulin could be demonstrated in the plasma of hour-old unsuckled piglets[2]. This corroborates the findings of Jakobsen and Moustgaard[4] who found no euglobulin in the serum of newborn pigs prior to consumption of colostrum. A sharp rise in euglobulin occurred after ingestion of colostrum, followed by a decrease during the first three weeks of life. A progressive increase was then noted until the pigs were five to six months of age, at which time the percentages of serum constituents stabilized.

Cameron[1] has reported that the precipitated gamma globulin from swine submitted for slaughter would protect susceptible swine when administered simultaneously with hog cholera virus. Other serum fractions were not tested for protective ability.

This investigation was undertaken to evaluate the response of swine to hog cholera vaccination and hyperimmunization. Vaccination in this study consisted of the simultaneous administration of unattenuated live virus and hyperimmune serum. No attempt was made to evaluate the effect produced by any of the hog cholera vaccines or modified virus preparations. Serum electrophoresis was the method used for evaluation of this response. Since available data indicate a stabilization of serum globulins after four months, animals of this older group were deemed most suited for this study.

Procedure

1. *Animals.* The nonvaccinated group consisted of four six-month-old swine which had no history of previous disease. These pigs were kept on a normal stock ration under good sanitary conditions from weaning to time of sampling.

The vaccinated group consisted of ten swine aged four, five and seven months at time of bleeding. The four- and five-month-old pigs were maintained under the same conditions as the nonvaccinated group. The seven-month-old group were pre-hyper animals held at a commercial serum plant. Samples were drawn three weeks to three months postvaccination. All animals were vaccinated according to the recommended procedures, using commerical serum and virus.

The hyperimmunized group consisted of 11 swine selected from a large number of animals at a commercial serum plant. These were subjected to routine handling and hyperimmunization using 5 cc. of virus blood per lb. of body weight. Age determinations were not possible. However, all animals weighed 250 lb. or more. Two of this group were sampled at 11 days after hyperimmunization and the remainder at the time of final bleeding.

2. *Sampling.* Samples were obtained from the anterior vena cava observing aseptic technic. Samples were transferred to screw-capped vials and clotted at room temperature. After one hour the clots were broken and the vials refrigerated overnight. After centrifugation the sera were aseptically removed and, if not immediately analyzed, frozen.

In addition, 42 samples of comercial, hyperimmune hog cholera antiserum were obtained for analysis. These pooled sera were produced by 11 widely separated plants.

3. *Analysis.* Each sample was diluted with four volumes of phosphate buffer, pH 7.6, and

†This work was supported in part by a grant from the Associated Serum Producers, Inc.

*Acknowledgement is made to the Fort Dodge Laboratories, Inc. for cooperation in these studies.

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dialyzed against the same buffer for 16 hours under refrigeration. Analyses were made in an Aminco portable electrophoresis apparatus using a current of 26 ma. for two hours. Final patterns were recorded photographically. After enlarging, areas were measured planimetrically, and percentages of each serum component calculated.

Results

As a basis for electrophoretic evaluation of the response of swine to vaccination and hyperimmunization, the percentage of serum constituents in nonvaccinated swine had to be established. Reference to table 1 will show that only four nonvaccinated animals were analysed. Considerable difficulty was encountered in obtaining nonvaccinated animals of this age, because of the usual practice of vaccination at time of weaning. The four animals studied were the only suitable subjects available. Using data obtained from these analyses an average distribution of 48.2% albumin, 17.8% alpha globulin, 15.9% beta globulin, and 18.1% gamma globulin was shown.

The vaccinated group showed an average distribution of 45.1% albumin, 18.2% alpha globulin, 15.0% beta globulin, and 21.6% gamma globulin.

The hyperimmunized group showed an average distribution of 38.0% albumin, 17.2% alpha globulin, 17.0% beta globulin, and 27.7% gamma globulin.

Two groups of processed commercial sera were considered: Those which failed the first protective test but later passed, and those which passed the first protective test. Average values for both groups were identical, namely 28.6% albumin, 48.2% of an unresolved fraction migrating in the alpha-beta globulin range, and 23.1% gamma globulin.

TABLE 1.

Sample source	No. in group	Age at time of sampling	Percentage of total area			
			Albumin	Alpha	Beta	Gamma
Nonvaccinated	4	6 mo.	48.2	17.8	15.9	18.1
Vaccinated	10	4-7 mo.	45.1	18.2	15.0	21.6
Hyperimmune	11	*	38.0	17.2	17.0	27.7
Commercial Sera Pools	12[1]	*	28.6	48.2[3]		23.1
	30[2]	*	28.6	48.2[3]		23.1

*Adult, age not determined. [1]Failed first test passed later test. [2]Passed first test. [3]Fraction not resolved.

Discussion

Reference to table 1 leads to the conclusion that there is a measurable response of swine to vaccination and a greater response to hyperimmunization. This response occurs as an increase in percentage of gamma globulin which has been shown to contain the immune factor for hog cholera. This increase in gamma globulin is not of the order of that seen in the hyperimmunization of horses against tetanus toxin, or pneumococcal polysaccharide, nor is it comparable to the response of rabbits to repeated injections of purified egg albumin. A response of this magnitude was not expected in view of the method of the virus administration and the relative impurity of the antigen. It is interesting to note that the gamma globulin level of the vaccinated animals was 21.6% of the total protein and of processed commercial serum pools 23.1%, only 1.5 percentage points higher than the vaccinates. However the percentage of gamma globulin found in the unprocessed sera of individual hypered animals was 27.7%, 6.1 percentage points above the vaccinated group, 9.6 percentage points greater than the nonvaccinated group and 4.6 percentage points greater than the processed commercial sera pools. Thus there is a loss of gamma globulin in the processed commercial sera pools of 48% of the total gained by hyperimmunization. It would seem apparent that this loss is associated with the processing of the hyperimmune sera.

In addition to the variations in gamma globulin it is of interest to observe the effect of the commercial processing of sera on the alpha-beta fraction. No significant changes were noted between the nonvaccinated and the vaccinated groups. A slight increase in beta globulin was noted in the hyperimmunized group which may be associated with the immune response. A drastic change was observed in the percentages of the alpha-beta zone in the processed commercial pools. The alpha-beta areas fused into one, high, broad-based peak. This area represented 14.0 percentage points more than the combined alpha-beta values of the individual hyperimmune sera. Along with the decrease in gamma globulin in the commercial pools there is a corresponding decrease of 9.4 percentage points in albumin from the figure noted in the individual hyperimmune animals.

As shown in table 1, all figures for both groups of commercial hyperimmune sera pools

(Continued on page 216)

Indication For Use Of A New Antibiotic In Veterinary Medicine

J. LAVERE DAVIDSON*, D.V.M., KENNETH B. HAAS*, D.V.M., and GORDON G. STOCKING*, D.V.M. Kalamazoo, Michigan

PANMYCIN® (tetracycline) is a bright yellow, crystalline, broad-spectrum antibiotic produced by a species of Streptomyces. Chlortetracycline, oxytetracycline, and tetracycline are closely related chemically. The molecular structure of panmycin differs from that of chlortetracycline by absence of a single chlorine atom, and from that of oxytetracycline by absence of an OH group. Panmycin is readily soluble in water, and is more soluble than chlortetracycline and more stable than either chlortetracycline or oxytetracycline.

Antibacterial Activity

Panmycin has activity against both Gram-positive and Gram-negative bacteria, the Rickettsiae, and certain viruses. The spectrum resembles that of the two other tetracyclines, but there are quantitative differences in sensitivity of organisms and of strains of the same organism to the tetracyclines.

The accompanying table lists the antibacterial activity of panmycin expressed in micrograms of the antibiotic per milliliter required to inhibit the test organisms.

TABLE I. Sensitivity of Bacteria to Tetracycline

Micrococcus pyogenes var. *aureus*	3.1
Hemolytic Streptococcus	3.1
Escherichia coli	6.3
Aerobacter aerogenes	25.0
Streptococcus sp	0.4
Salmonella sp	12.5
Proteus vulgaris	200.0
Pseudomonas aeruginosa	200.0

Pharmacology

Absorption. Administered orally, panmycin is absorbed from the gastrointestinal tract. It diffuses readily into the various body fluids, including thoracic, abdominal, and spinal fluids, blood and cord serum, and saliva. Maximum blood levels are attained approximately two hours after administration and are maintained at high levels for a least eight hours. Blood levels were noted to be somewhat higher, and spinal fluid levels considerably higher than those obtained with the other tetracyclines. The high spinal fluid levels indicate greater tendency of tetracycline hydrochloride to traverse the blood-brain barrier.

Excretion. Urinary excretion of tetracycline is rapid, the rate approximating those of the other two forms. A significant portion of the oral dose is unabsorbed and appears in the feces.

Toxicity. Toxicity studies conducted in laboratory animals indicate that panmycin possesses a low order of toxicity. Doses as high as 100 mg./kg. orally, twice daily, were not observed to cause toxic manifestations in dogs. A change in consistency of the stools in cats and dogs may be anticipated, due to the wide antibacterial effect on intestinal flora.

Indications

Panmycin is indicated in infectious processes caused by tetracycline-sensitive bacteria. These include a wide variety of important diseases in both large and small animals: Genitourinary tract infections such as endometritis, pyometritis, nephritis, pyelonephritis, and cystitis; gastrointestinal infections such as enteritis, coccidiosis (dogs only), calf scours, and lamb dysentery; respiratory infections such as pneumonia, tonsillitis, sinusitis, bronchitis, pharyngitis, calf diphtheria, equine influenza, and upper respiratory mixed infections. Other indications include foot rot, bacterial complications of virus diseases, feline panleukopenia, parotitis, bacteremia, abscesses, necrotic stomatitis, and infected superficial wounds.

Dosage

Dosage, as with other tetracycline drugs, will vary in different animals according to severity of the infection, response to treatment, and susceptibility of the causative bacteria.

*Department of Veterinary Medicine, Medical Division, The Upjohn Company.
†The Upjohn Company, Kalamazoo, Mich.

The following average doses are recommended: Large animals — 5 to 10 mg./lb. body weight daily, usually in divided doses; dogs and cats — 10 to 50 mg./lb. body weight per day, usually in divided doses. Treatment should be continued for several days after characteristic symptoms have disappeared. In dogs and cats, panmycin usually is well accepted, but it may be administered with cold milk or a light feeding if necessary. Supportive therapy should be administered concurrently in all cases in which it is indicated.

Summary

Panmycin is one of the newest antibiotics to be introduced into animal medicine. The antibiotic, its pharmacologic action, and antibacterial effectiveness are described. Indications for use, and suggested dosage are presented.

REFERENCES

1. Finland, M., *et al.*, Clinical and Laboratory Observations Of A New Antibiotic, Tetracycline. *Jour. Am. Med. Assn.*, 154:561 (Feb. 13), 1954.

2. Boothe, J. H., *et al.*, Tetracycline. *Jour. Am. Chem. Soc.*, 75:4621 (Sept. 20), 1953.

3. Conover, L. H., *et al.*, Terramycin: XI. Tetracycline. *Jour. Am. Chem. Soc.*, 75:4622 (Sept. 20), 1953.

4. Welch, H., editorial, An Appraisal of Tetracycline. *Anti. & Chemothera.*, 4:375 (Apr.), 1954.

5. Putnam, L. E., Hendricks, F. D., and Welch, H., Tetracycline: A New Antibiotic. *Anti. & Chemothera.*, 3:1183 (Dec.), 1953.

6. Love, B. D., *et al.*, Antibacterial Action of Tetracycline: Comparisons With Oxytetracycline and Chlorotetracycline. *Proc. Soc. Exp. Bio. Med.*, 85:25 (Jan.), 1954.

7. ———————, Editorial. Tetracycline: A New Antibiotic. *New Eng. Jour. Med.*, 250:534 (Mar. 25), 1954.

8. Glatt, M., and Ross, S., Tetracycline In The Treatment Of Bacterial Pneumonia In Children: A Preliminary Report. *Anti. & Chemothera.*, 4:395 (Apr.), 1954.

9. English, A. R. *et al.*, Tetracycline—Microbiologic, Pharmacologic, Clinical Evaluation. *Anti. & Chemothera.*, 4:411 (Apr.), 1954.

10. Sanchez, F. R., Treatment of Exanthematic Typhus with Tetracycline. *Anti. & Chemothera.* 4:402 (Apr.), 1954.

11. Trafton, H. M., and Lind, H. D., Tetracycline—Clinical and Laboratory Observations in Chronic Urinary Tract Infections. *Anti. & Chemothera.*, 4:697 (June), 1954.

12. ———————, Antibiotics Annual 1953-1954, New York, Medical Encyclopedia, Inc., publishers, 1953.

13. Lutzenkirchen, A., and Schoog, M., Vergleichende bakteriologische und tierexperimentelle Untersuchungen und klinische Beobachtungen uber Tetracycline (Comparative bacteriological and experimental animal investigations, and clinical observations on tetracycline.) *Arzneimittel—Forsch.*, 8:485 (Aug.), 1954.

Immunological Response of Swine to Hog Cholera

(Continued from page 214)

were the same. This would indicate that the failure of the 12 sera to pass the first protective test was not due to the lack of gamma globulin but to other factors which are not understood. Therefore serum electrophoresis will not predict the animal response of any given serum.

It is evident from the data that a definite decrease in gamma globulin occurs during commercial treatment of the hyperimmune sera. Study of the commercial process is being conducted to determine the point or points at which the discrepancies between the patterns of individual hyperimmune and commercial sera occur.

Summary

Electrophoretic analysis was applied to the sera of four nonvaccinated, ten vaccinated, and 11 hyperimmune swine sera, in addition to 42 commercial hog cholera antisera pools. Visible changes were noted in the gamma globulin level between nonvaccinated and vaccinated animals, a greater response was observed on hyperimmunization although not of the magnitude noted in hyperimmunized horses. Analysis of the commercial pools shows a 48% loss of the gamma globulin gained by hyperimmunization, that is, of the 9.6 percentage points gained over the nonvaccinated animals, 4.6 percentage points are lost, due apparently to the commercial treatment of the sera. A loss was noted in albumin, as well as a failure of the alpha-beta fractions to resolve in the commercial pools.

No differences in electrophoretic pattern were found in the commercial sera pools which failed to pass their first protective tests but later passed and those which passed on the first test.

REFERENCES

1. Moore, D. H., Shen, S. C., and Alexander, C. S. *Proc. Soc. Exp. Biol. and Med.*, 58:307, 1945.

2. Bauriedel, W. R., Personal communication. Veterinary Medical Research Institute, Ames, Ia.

3. Jakobsen, P. E., and Moustgaard, J. *Nord. Vet. Med.*, 2:812, 1950.

4. Cameron, H. S. *Am. Jour. Vet. Res.*, 8:153, 1947.

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A.V.M.A. Minneapolis, Aug. 15-18, 1955

Choleliths in a Ewe

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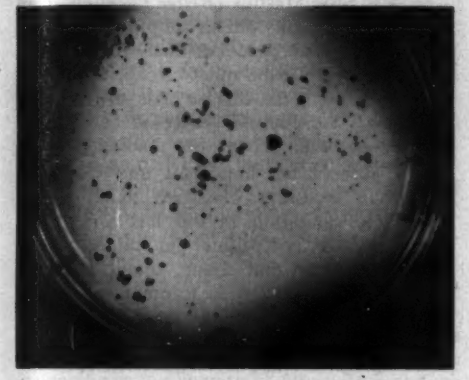
D. F. EVELETH*, Ph.D., D.V.M.,
Fargo, North Dakota

Biliary concretions are not uncommon in man but are rare in other animals. Hutyra and Marek[1] stated that true gallstones are found most frequently in the horse and ox, more rarely in the dog and exceptionally in the cat, pig, and sheep. Schlotthauer and Stalker[2]



Photograph of the stones removed from the bile ducts of the ewe.

and Schlotthauer[3] reported cases of gallstones in dogs. Morton[4] described an ovine biliary calculus that "weighed 12 grains and contained 70% of cholesterin, calcic phosphate and carbonate and the usual biliary elements." Newsom[5] makes no mention of biliary calculi as a clinical entity.

In the case reported here, a ewe had been purchased for tests with anthelmintics and had been injected intraperitoneally with an anthelmintic. The animal died 13 days following injection, having been off feed and water for four days. Postmortem examination revealed no trace of the anthelmintic. The only pathological conditions were evidence of a distended gall bladder and common bile duct, and a slightly enlarged liver. The gall bladder, common bile duct, and some of the larger biliary ducts contained stones. At least 100 stones were collected, the majority of which were green in color. Some of the stones were greenish-black and some of the smaller ones were not pigmented.

Chemical analysis of the green and greenish-black stones revealed bilirubin and biliverdin present in the outer layers. All stones contained calcium, carbonates, and phosphates. A small amount of cholesterol was present in the pigmented stones, however, none was present in the colorless ones.

*Department of Veterinary Science, North Dakota Agricultural College, State College Station.

†An observation made while carrying out a cooperative project between the North Dakota Agricultural Experiment Station and the Animal Disease and Parasite Research Branch, Agricultural Research Service, United States Department of Agriculture.

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REFERENCES

1. Hutyra, F. and Marek, A., Special Pathology and Therapeutics of the Diseases of Domestic Animals. Chicago, Alexander Eger, 1926, 3:428-431.

2. Schlotthauer, C. F. and Stalker, L. K., Cholelithiasis in Dogs. Report of Two Cases, *Jour. Am. Vet. Med. Assn.*, 88:758, 1936.

3. Schlotthauer, C. F., Gallstones in Dogs. Report of Two Cases, *N. Am. Vet.*, 26:349, 1945.

4. Morton as cited by John Law, *Jour. Vet. Med.* Ithaca, N. Y., Andrus and Church, 1900, 2:523.

5. Newsom, I. E., Sheep Diseases. Baltimore, Williams and Wilkins Co., 1952.

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Post-Traumatic Ventral Hernia

JOHN P. MANNING,* D.V.M., and
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A four-year-old Suffolk mare was presented to the Clinic with a history of having jumped a four-foot fence over a steel shaft which penetrated the abdominal cavity.

Examination revealed a reducible hernia four to five inches in depth, width and length located four inches lateral to the median line and approximately eight inches posterior to the attachment of the diaphragm. The ring was about three inches in diameter and had thick, firm edges. The skin was healed as almost a month had elapsed since the trauma had occurred.

In order to reduce the bulk of the abdominal contents, the hay ration was cut in half for three days.

Because of the likelihood of the hernial ring being difficult to locate after the patient was placed on the table, preparation for surgery was done with the mare in the standing position. The area was shaved, washed with soap and water, and painted with tincture of metaphen[@1]. The patient was then given 100 cc. of equitol[@2] intravenously and placed on the hydraulic operating table. Just prior to surgery

*College of Veterinary Medicine, University of Illinois.

@1Abbott Laboratories, North Chicago, Ill.
@2Pitman-Moore Company, Indianapolis, Ind.

an additional 100 cc. of equitol was administered intravenously.

Surgical Technic

The operative area was desensitized by local infiltration with 2% procaine. A six-inch, elliptical incision was made over the hernia and the strip separated and removed from the underlying tissue. Fascial edges of the ring were undermined by blunt dissection for a distance of one inch from the edges of the ring. The herniated sac and contents were replaced within the abdominal cavity and a four-inch square of plastic gauze mesh (proxplast surgical mesh — Goshen Laboratories, Goshen, N. Y.) was placed deep to the fascial ring and tucked in between the fascia and peritoneum. The plastic mesh was anchored to the fascial ring by six perpendicular mattress sutures of .026 stainless steel wire. Number 3 surgical gut suture, type D, was used to approximate the free edges of the ring to the mesh by means of a continuous suture. A number of mattress sutures of no. 2 braided silk were used to approximate the edges of the skin. Tetanus antitoxin (1500 units) and 3,000,000 units of penicillin were administered hypodermically.

The patient was removed from the table and an antibiotic dressing applied by encircling the mare with adhesive tape. The patient made an uneventful recovery.

Discussion

Because of the great weight involved and actual loss of tissue forming the ring, the problem was one of artificial repair. Bridging tissue defects of this type satisfactorily without the addition of supportive material would be difficult, if not impossible. Supplanting fascia and muscle with plastic mesh proved to be good substitution.

REFERENCE

1. Danks, Gordon, Umbilical Hernia in Calves. *Southwestern Vet.*, 7:27, 1953.

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When a veterinarian is called to attend an animal obviously affected with leptospirosis by reasons of anemia, jaundice, and associated signs, it is more logical to give that patient supportive treatment, including adequate blood transfusion. The remainder of the herd should be screened for febrile animals and these given courses of antibiotic therapy.—*Karl R. Reinhard, D.V.M.*

Dairyman Cooperation Essential for Mastitis Control

Veterinary authorities have been insisting for years that mastitis control must encompass good management practices to succeed. Research workers have demonstrated various infectious agents and pharmaceutical manufacturers have developed refined specifics, yet mastitis is still the dairy industry's most common and costly disease.

How to Stop Mastitis (*Better Farming*, April 1955, p. 37) points out in simple terms sensible and rational practices that are essential if dairymen are to be relieved of a $225,000,000. annual lug the disease puts on dairying. It is good "herd-level" advice to recommend to your dairyman client for reading.

The authors list important and intelligent preventive measures classified as wise and reasonable sanitation in the lots and barns. These require no genius but understanding of the principle that tissue, under stress of maximum function, when traumatized, is susceptible to ubiquitous, infectious agents. The effort to keep down exposure to pathogenic microorganisms and provide facilities for comfort and that avoid possible hazards are sound procedures the dairyman can follow. Nor can these be relaxed at any time. "Mastitis control is a constant job."

In regard to treatment, the author emphasizes need for selection, thoughtful application, and proper timing of treatment for best results from modern therapeutic agents in individual cases.

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Phenothiazine Particle Size

A report from the School of Veterinary Medicine, University of California indicates that the degree of fineness of phenothiazine is an important factor in the number of sheep or cattle stomach worms destroyed. It is explained that phenothiazine is relatively insoluble; also, that the drug has much greater opportunity to establish intimate contact with the parasite, and thus exert its lethal action, when finely powdered. For example, when the phenothiazine particles had an average diameter of 150 microns, the reduction in worm count was only 20%; when size was reduced to 10-microns, efficiency was 95%.

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Management errors are responsible for 80% of all diseases of sheep.—*Frank Thorp, Jr., D.V.M.*

Incidence Of *Corynebacterium Pyogenes* Among Animals And Birds In Egypt

OSMAN A. ZAKI, D.V.M., M.Sc. (Cairo), B.Sc. Hons. (Liverpool),* and
HOSSEIN FARRAG, D.V.M., M.V.Sc. (Cairo), Ph.D. (Kansas)*

OUR attention has been drawn lately to the high incidence of *Corynebacterium pyogenes* isolated from materials of sick or dead animals and birds brought to the laboratory for bacteriological examination. As is known, this is the most frequent pus-forming organism found in animals, but the fact that it was isolated on two occasions from two different species of birds is interesting; an observation, which, to our knowledge, has not been reported before. The writers, therefore, thought it would be of value to record briefly the data of incidence of this organism in this country.

Sheep. In 1946, an outbreak of contagious ovine pneumonia occurred on a sheep farm belonging to the Faculty of Agriculture at Giza and a filtrable virus was found to be the cause. *C. pyogenes* was, however, invariably isolated from the suppurative lesions of the lungs.

Swine. In 1947, while investigating the etiology of swine pneumonia during an outbreak of swine fever on some farms near Cairo, *C. pyogenes* was isolated from 35% of the pneumonic lungs. It was always found in the chronic cases where pneumonia was associated with suppuration and gangrene.

Camel. In 1949, in a bacteriological study of pneumonia in camels in Egypt, *C. pyogenes* was isolated from ten out of 50 pneumonic lungs of animals slaughtered at the Cairo abattoir.

Horse. In 1950, this organism was isolated from four out of nine Arab mares suffering from metritis associated with sterility.

Dog. In 1951, a bitch died from pyometritis. On postmortem examination, the uterus was found to be full of mucopurulent material, which, on bacteriological examination, revealed *C. pyogenes.*

Birds. (1) In 1951, a dead fancy bird, *Melopsitacus undulatus,* was brought to the laboratory for bacteriological investigation. The history given was that it had been off food, had developed diarrhea and had died after three days. Salmonella infection was suspected and, accordingly, the heart blood was plated out on McConkey's medium. After 48 hours' incubation at 37 C., contrary to our expectation, nothing but exceedingly minute dewdrop-like colonies could be detected. A colony was picked up to obtain a pure culture, which proved to be *C. pyogenes.* (2) In the same year, an outbreak occurred in a flock of Orpington chickens on one of the Ministry of Agriculture's poultry farms. The sick birds had been off food and had developed a characteristic rattle. The disease ran a rather chronic course. One of the dead birds was sent to the writers for bacteriological examination. Autopsy lesions were small abscesses in the air sacs and mucous membranes; the trachea was packed with caseated material. Bacteriological examination of the heart blood and the caseated material revealed *C. pyogenes.*

According to this bacteriological finding, the writers thought that penicillin might be of value in combating the outbreak. A sick bird was selected from the flock and treated with procaine penicillin in doses of 100,000 units daily for four days. The bird was absolutely cured and improvement could be noticed from the second day of treatment.

Egyptian Buffalo. This was a case of traumatic reticulitis, and rather interesting. In 1951, the writers received a sample of pus which was taken from an abscess in the right side of the chest and situated in the lower part behind the elbow joint. Bacteriological examination of the material revealed a pure culture of *C. pyogenes.* The abscess was evacuated and attended to surgically, but it showed no tendency toward healing. During its dressing in the usual way, the point of a wire was detected in the wound. This was pulled out, and measured about 10 cm. Following removal of the wire, the wound healed rapidly. Evidently, this was a case of traumatic reticulitis; the animal ingested that piece of wire with its food, and from the reticulum it pierced its way out through the chest wall and was responsible for the localized infection.

*Assistant professors in bacteriology, Faculty of Veterinary Medicine, Fouad I University, Giza, Cairo, Egypt.

Summary

1. *Corynebacterium pyogenes* has been isolated in Egypt from a variety of pyogenic infections occurring in different species of animals and birds.

2. In a few mares, this microorganism caused metritis and was responsible for sterility; while it caused pyometritis and death of a bitch. It was almost invariably associated with suppurative and gangrenous pneumonia in camels, sheep and swine. In a case of traumatic reticulitis in a buffalo, it was isolated in pure culture from the pus evacuated from the abscess.

3. *C. pyogenes* caused septicemia and death of a fancy bird, *Melopsitacus undulatus;* while it was isolated from the suppurative lesions in an outbreak among Orpington birds. It is interesting to note that one responded to penicillin treatment.

REFERENCES

1. Morcos, Z., Zaki, O. A., and Zaki, R., Contagious Ovine Pneumonia Caused by a Filtrable Virus. *Vet. Med.*, 41:202 (June), 1946.

2. Morcos, Z., Zaki, O. A., and Zaki, R., Bacteriological Study of Swine Pneumonia in Egypt. *Vet. Med.*, 42:255 (July), 1947.

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Paper can Help Prevent Disease

WINFIELD S. STONE, D.V.M., Albany, New York

Every livestock owner knows that keeping animals healthy is a major part of his production problems. Disease can so upset a well-planned program that anticipated profits turn out to be net losses. Often good management can prevent the introduction of disease into herds or flocks.

Livestock men have shown interest in learning more about the principles of good sanitation and improved sanitation practices are in evidence on many farms. It is not uncommon to have disinfecting devices at the entrance of barns so that caretakers or visitors must step in the solution and thus leave behind any disease-producing organisms carried on boots or shoes. Printed signs also are observed warning "Cattle Dealers Keep Out" or "Don't Walk in Front of the Cows."

Such precautions are taken because owners recognize that disease can be spread in this manner. There is also concern over the possibility of returnable feed bags contributing to the mechanical dissemination of contagious or infectious diseases. This anxiety is well founded and practitioners may recommend without reservation the one-trip multiwall paper sack for poultry and other feeds.

Laws and regulations have been promulgated in certain states to permit only the use of new or sterilized bags. New York state recognized that reused bags might carry human diseases, and in 1947 adopted a regulation making it mandatory that, "flour and other cereals intended for human consumption shall not be packed and distributed in any used bag, sack, or other container unless such bag, sack, or other container first shall have been laundered. The term 'launtered' shall mean the submerging of the bag, sack or other container in boiling water and a complete washing of the same by the use of a standard soap or other standard cleansing agent."

Paper Sacks are Popular

In 1950 and 1951, feed manufacturers turned to the use of paper bags and interest in paper is still spreading. Paper bags have been standard for many products such as cement, soil building materials, and fertilizer.

The 50-lb. multiwall paper feed sacks are easy to handle, to open, and to empty. The feed stays fresh even after long storage and does not absorb moisture. Paper sacks are not attractive material for rats and mice to use in building nests. There is no sifting loss and feed rooms may be kept clean. Multiwall paper sacks never have been known to carry disease from one farm to another and therefore can relieve anxiety about keeping livestock disease-free.

Many livestock owners appreciate that a clean bag is important in disease prevention and want their feed delivered only in paper bags. The multiwall paper sack now in common use is never refilled with feed. It is easily disposed of by burning.

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Cattle Bloat

From a Wisconsin report we have learned that skyl aryl sulfonates, the alleged basic material in many household detergents is apparently an effective agent for the control of bloat in cattle. It was tested on 1,400 cows on 48 farms in 1954. The difficulty is that this substance is intensely bitter and therefore cattle will not voluntarily consume it. Efforts are being continued by veterinarians of the Wisconsin experiment station to make the chemical palatable by incorporating it in some substance that will mask its bitterness.

EDITORIAL COMMENTS

Incidence of Rabies in the United States — 1954

Statistics on the number of cases of rabies reported in the United States for the calendar year 1954 have been made available by the Agricultural Research Service, USDA. This report was compiled from return of questionnaires mailed to state livestock sanitary officials and public health officers.

There were 7,282 cases reported in all species, distributed as follows:

Dogs	4,083	Sheep	23
Foxes	1,028	Goats	10
Cattle	830	Squirrels	8
Skunks	547	Coyotes	5
Cats	462	Rats	5
Raccoons	48	Muskrats	5
Swine	40	Other Animals	51
Horses	29	Man	8

The three states reporting the largest number of cases include: Texas with 1,081, New York 472 (of which 250 were in cattle), and Alabama 458. No cases were reported in 13 states, and in an additional five, less than 10 cases. This is 1,555 cases fewer than reported for 1953. There were six fewer confirmed cases in man during 1954. Kentucky reduced incidence from 1,162 in 1953 to 328 in 1954 due to enforcement of legislation designed to control the disease, which became effective on July 1, 1954. There were more cases of rabies confirmed in skunks (157) in Iowa than dogs (46). Alabama reported 106 in foxes, while New York reported 155 in the same species, with only 26 cases in dogs and 23 in cats.

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Centennial Year for Michigan and Pennsylvania

Two great land-grant educational institutions, Pennsylvania State University and Michigan State College are a century old this year. A special stamp, honoring these schools, has been issued by the Post Office Department and appropriate ceremonies are scheduled throughout the year.

Contributions of both institutions are legend; each has added to the great fund of knowledge which has made the United States the safest place in the world to raise livestock, thereby assuring everyone plenty of the finest animal food products.

Results of Stilbestrol Feeding Test

Preliminary report by Dr. C. W. Turner, University of Missouri scientist, indicates the absence of measurable amounts of estrogenic substances in tripe or other portions of the wall of the digestive tract from steers slaughtered after 148 days of feeding supplements containing stilbestrol. Amount supplied was the recommended 10 mg. per day.

The seriological test employed is claimed to be extremely sensitive. Immature female mice are fed measured amounts of tissue for a fixed period, after which the uterus is weighed. Under even slight estrogenic stimulation uterine weight increases are significant and measurable.

Mink ranchers have been awaiting results of these tests being conducted in a number of laboratories. These wish to avoid serious losses in kit production that resulted previously from feeding heads and necks of chickens implanted with stilbestrol pellets. These had not disintegrated entirely and sufficient of the hormone remained to cause abortion in pregnant females.

The National Mink Board Permanent Committee on Research is recommending that the feeding of tripe to mink should be discontinued until the absence of the chemical, under all conditions, is completely established.

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Garbage Cooking in Iowa

Lower death losses and better gains in swine are bonuses to garbage feeders in Iowa that now feed only cooked garbage. An article appearing in the current issue of *Public Health Reports* (90:314 [Mar.], 1955), states that when the Iowa law requiring heat treatment of garbage went into effect, there were more than 400 feeders in the state. Objections raised by this group stemmed from lack of information as to methods of cooking, economical aspects of the problem, and palatability of the cooked material. Since enforcement of this legislation, the number of garbage feeders has been reduced from 400 to 60 but is steadily increasing. Majority of cookers are homemade and must be supervised carefully to assure proper treatment and fuel economy.

All operators interviewed by the authors reported that they have gained rather than lost under the new regulations.

Sanitary procedures in feedlots also have been improved under a system of continuous inspection. These matters are certain to affect favorably the incidence of zoonoses in Iowa.

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92nd Annual Meeting — A.V.M.A. Minneapolis, Minnesota August 15-18, 1955

Minneapolis, Minnesota will be host city for the annual meeting of the A.V.M.A. in 1955.

Hub of the upper Midwest, Minneapolis is the focal point for extensive transportation networks and a service center for a vast agricultural empire. Because of its central location, its accessability to many veterinarians and its position as a gateway to the famed Paul Bunyan playground, a record-breaking attendance is forecast.

Though hotel facilities are comfortable and adequate, facilities of the Municipal Auditorium wisely were selected by convention officials for general and session meeting rooms, exhibits, and indoor entertainment features.

Hotel accommodations are being handled by the local Convention and Visitors Bureau in cooperation with the Committee on Local Arrangements. By this method housing will be provided all visitors in one of the 18 hotels which have allocated rooms. Rates will be published each month together with a reservation form in the *Journal of American Veterinary Medical Association*, or these may be obtained by writing the A.V.M.A. office.

Details of the technical program will be announced later. Suffice it now that those charged with that responsibility are well qualified, which assures a timely and interesting program. A preconvention session will be held at the Radisson Hotel on Sunday, August 14, devoted to the subject of Veterinary Medical Examination and Licensure. All interested veterinarians are invited to attend.

Vacation Information

Portions of Minnesota, Wisconsin and southern Ontario offer vacation attractions in infinite variety.

Business and financial district of downtown Minneapolis. Sessions will be held in the Municipal Auditorium (left foreground). Mississippi River and milling district in background.

Hotels and camps dot a vast area along the shores of innumerable lakes. Weather conditions are normally mild and pleasant with warm days and cool evenings. Travel and vacation resort information may be obtained from Resort Associations listed on the back cover of Minnesota Vacation Almanac, a copy of which may be obtained from the Division of Promotion, State Capitol, St. Paul 1, Minn.

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Mucosal Disease

Cattlemen are advised by the College of Veterinary Medicine, University of Illinois, Urbana, through *Timely Topics*, to observe herds closely for first evidence of unexplained scouring, primary symptom of mucosal disease. Several outbreaks have been observed during the past few months.

The disease has occurred sporadically in Illinois, often affecting only one or two animals in a herd at the same time. In this respect it differs from virus diarrhea of cattle, as reported from New York. In the latter, infection attacks an entire herd rapidly. The diseases are caused by separate viruses.

In addition to profuse diarrhea, which may become blood-stained, mucosal disease is characterized by ulcerations on the muzzle, lips, tongue and gums. Postmortem examination frequently discloses similar ulcerations in other parts of the digestive tract. Affected animals lose weight rapidly and die within a week to ten days.

No specific recommendations can be made for treatment, but field reports suggest benefit from symptomatic therapy when begun early in the disease course. These include selected antispasmodic, antidiarrheal mixtures, stimulants, et cetera.

Roving Dogs Menace Sheep Industry in Kentucky

"Thousands of farmers throughout the South and Midwest have been forced out of the sheep business by dogs," stated Richard C. Miller, sheep specialist, University of Kentucky, in *Better Farming*, April 1955.

Roving dogs are claimed to have destroyed the industry in eastern Kentucky hill country where sheep breeding could be a $15,000,000. farm project. Adding to losses suffered by Kentucky growers because of dogs (estimated to average $3,000,000. per year to livestock) a recent poll of farmers indicated that cost of antirabies treatments in that state was approximately $300,000. annually. For some years the "rabies belt" has included the state of Kentucky.

A new state law was passed in July 1954. This legislation requires vaccination and licensing of all dogs and provides wardens and pounds for each county. It also requires restraint of all dogs at night, sets aside funds from dog licensing to pay stock damages, points up owner responsibilities, and provides for quarantine in event of an outbreak.

In effect, this takes the semi-wild, unwanted and uncared-for roving dog that may become a sheep-killer out of existence. It is good legislation and has been supported by the livestock industry and dog owners alike. Already some 4,000 sheep have been put back into the eastern Kentucky area as a pilot project which will not only demonstrate the law's effectiveness but the efficiency with which it is enforced.

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A phenothiazine pack has been most satisfactory for treatment of summer sores (cutaneous habronemiasis) in horses. — *L. D. Beck, V.M.D.*

The beautiful and spacious Municipal Audtorium, will provide ample facilities for all convention activities, including general and section sessions, commercial exhibits, and convention offices.

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Continuous Phenothiazine Recommended for Sheep

As the grazing season approaches, veterinarians are encouraged to consider recommending pehnothiazine for the control of intestinal parasites of sheep. Hairworms, wireworms, nodular worms, stomach worms, and hookworms are susceptible to continuous exposure to this anthelmintic when offered (one part phenothiazine mixed with nine parts salt) during the spring and summer grazing periods. Prepare comparatively small batches at a time and protect the mixture from moisture and rain. If indicated, the same mixture may be kept available for cattle.

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Agalactia in Sows

When a sow does not have enough milk for nursing pigs, it usually shows up in the latter by an undernourished appearance and frequently an eczematous dermatitis. The area surrounding each of the sow's nipples may be teeth marked. Cause of porcine agalactia may be poor quality or insufficient feed, toxemia, metritis, excessive parasitism, et cetera. The effects of agalactia in this species is always more serious than is a corresponding condition in calves.

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Atrophic rhinitis is an ihsidious condition as evidenced by the fact that there are outbreaks in droves previously free of the disease. The only explanation offered for appearance is introduction of infection by importation of additions to the drove even though the newly acquired animals appeared in good health. Usually the first symptoms are sneezing and attempts to rub the itching facial region. These same early symptoms are observed frequently when dry lime dust or dip disinfectants have been used recently in the pens. These latter induced symptoms soon disappear. Those caused by atrophic rhinitis do not. Nevertheless, during sneezing and itching stages, it is well to recommend sanitary steps. Later bulging of the facial region, nasal discharge, and stertorous breathing leave no doubt of the nature of the condition.

Salpingeal Stenosis

Veterinarians are finding, with increasing frequency, insofar as clinical diagnositic methods permit, blockage of the oviducts in cases of infertility in cows. In this connection, the diagnostic method devised by Dr. L. E. McDonald, physiologist at Oklohoma A. & M. College, is worthy of repetition. It consists in using a gravity apparatus to make an intraperitoneal injection of 500 cc. of a sterile, soluble starch solution. Two or three days later vaginal swabs are made, and these are placed in a small quantity of saline solution to which has been added four drops of Lugol's solution of iodine. A few drops of the iodized saline are placed on a slide for microscopic examinations. If this discloses the presence of bluish-purple bodies it points to the fact that one or both oviducts are patent. Absence of stained bodies indicates nonpatency of the oviducts as a cause of sterility.

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Yolk Color — Influence on Palatability

Veterinarians occasionally are asked to pass on the palatability, for human consumption, of eggs having decided off-color yolks. The color may vary from olive to green. Colloquially, the eggs are usually spoken of as "grass" eggs. There is a tendency for the yolks to darken still more in storage. Since the off-color is undoubtedly due to something in the fowl's food, chlorophyll has been mentioned though its etiological significance has not been definitely established. Since there is no bacterial decomposition, eggs are entirely fit for human consumption. When discovered by candling, discolored egg yolks are a cause for lower grading.

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Jowl abscesses of swine are a cause of considerable concern to swine producers and packers. It is reported that in some Midwest packing plants the number of head condemnations is as high as 7%. The exact cause of the condition is not known, nor have attempts to control the condition by sanitary steps, including depopulating affected herds, been successful.

Canine Microsporosis

M. RISTIC,* Dipl. Vet., D.V.M., M.S., and D. A. SANDERS,* B.S.A., D.V.M., Gainesville, Florida

FUNGUS infections of the skin in the dog due to *Microsporum canis* present a difficult problem from a therapeutic standpoint. Discovery of new fungicidal agents and development of therapeutic methods recommended for local application to affected skin areas make it desirable to observe their efficacy on clinical cases of Microsporum infections.

This report concerns observation on the three clinical cases of *M. canis* infection of dogs which were identified by isolation of the fungus from diseased dermal tissue, together with results of artificial transmission experiments and therapeutic measures attempted.

Isolation and Cultural Technic

Recovery of *M. canis* was accomplished after washing the affected skin with warm, soapy water, drying the area, and applying mild tincture of iodine. Several hairs in the affected area were extracted from the follicles by manual epilation, using sterile forceps. The hair was immediately planted on Sabouraud's dextrose agar plates, pH 5.5, incubated at room temperature and examined daily for four weeks before being considered negative. Within three to 12 days there was noted the development of small, flat, regular edge colonies having cottony, aerial mycelium and occasional yellowish-brown center pigmentation. The colonies contained numerous microscopic, multiseptate, spindle-shaped macroconidia having a thick wall and rough surface (fig. 1). The fungus was identified by Benham's[1] method as *M. canis*.

The criteria used for determination of a cure in the clinical cases under observation consisted of direct examination under Wood's lamp of

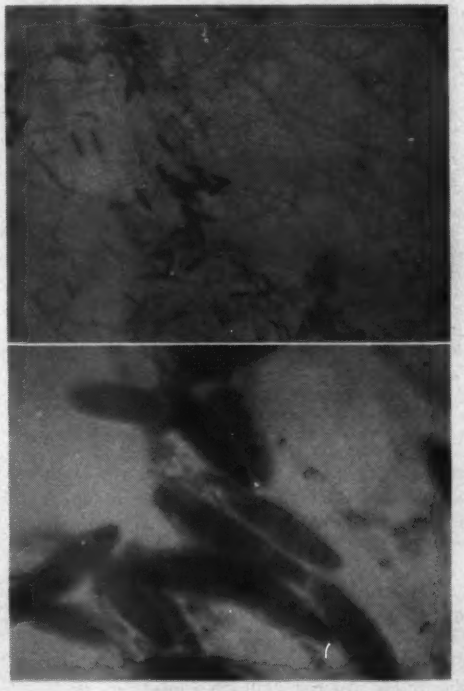

Fig. 1. Microsporum canis. Eight days' growth on Sabouraud's dextrose agar. (Upper) Well developed with numerous macroconidia X 150. (Lower) Multiseptate, spindle-shaped, thick wall macroconidia X 450.

*Department of Veterinary Science, University of Florida, Agricultural Experiment Station.

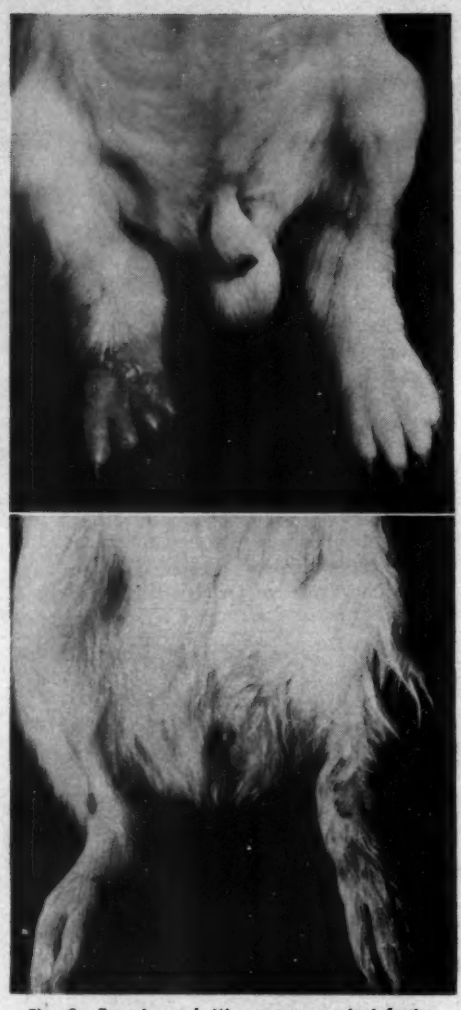

Fig. 2. Experimental Microsporum canis infection in a rabbit (upper), consisting of complete alopecia, crust formation and tissue edema and a guinea pig (lower), consisting of partial alopecia and scaling.

the suspected skin area as described by Georg[3] and isolation of the fungus by methods outlined in the foregoing.

Experimental Transmission

To study the possibility of artificial transmission of infection with *M. canis*, three two-week-old rabbits, three hamsters, and three guinea pigs five months of age, and a six-month-old yearling bull were used.

Infected hair roots were extracted manually from diseased areas of the pups and applied to scarified skin on the dorsal surface of the feet of the experimental animals. The scarified area, thus inoculated, was covered with cheesecloth which was taped in position for 24 hours. After removing the protective covering, daily observations were made for three weeks to observe any evidence of transmission. Two of the rabbits, one guinea pig, and one hamster developed visible clinical evidence of infection within eight days following application of infected material to the scarified skin. The lesions consisted of alopecia, scaling, erythema, crust formation, and tissue edema (fig. 2). *M. canis* was recovered from the lesions. The other experimental animals which were exposed similarly remained negative throughout the three weeks' observation period.

Description of Cases and Treatment

1. Male Cocker Spaniel, age two months. Partial alopecia of dorsal surfaces of front feet and skin of nasal region was observed initially. Further development consisted of dermatitis, folliculitis, and crust formation. At this stage treatment was begun by washing the area with soap and warm water and making daily application of an ointment consisting of 25% zinc ethylene bis-dithiocarbamate in a base of carbowax. The drug is a derivative of dithiocarbamic acid described as a fungistatic agent *in vitro*[4]. No improvement occurred during two weeks' treatment. The primary lesions were followed by development of various grades of inflammatory reactions, consisting of erythema and tumor-like tissue formation, with pus exuding from multiple sinuses. Superimposed bacterial invasion of the lesion around the nasal and oral regions resulted in acute lymphangitis (fig. 3). The animal became stiff, showed subnormal temperature and died three weeks following initial application of the ointment. No gross internal lesions were found at autopsy.

2. Female Cocker Spaniel, age approximately four months. Alopecia with considerable scaling was noticed first between the toes of the left foot, which gradually spread over the surrounding area without evidence of inflammatory reaction. Treatment consisted of topical application at various intervals of fungicides and irritants including Lugol's solution, sodium hypochlorite, Nessler's reagent (potassium iodide and mercuric iodide in 7% sodium hydroxide). Improvement was evident after one month's treatment at which time infection was limited to two digits of the left foot (fig. 4). However, the end result of the case is unknown.

3. Male Boxer, age three years. Two areas of partial alopecia with orange-brown crust formation, progressing into erythema and tissue edema became apparent on the right front foot.

Therapeutic routine employed was, in general, that described by Strickler[8]. Five percent acetic acid was swabbed for two to four minutes daily over the infected skin area and immediately exposed to the heat sensation of a 100-watt electric light bulb at a distance sufficient to dry the material in two to three minutes. The iodine and oil combination was then rubbed upon the lesion for two minutes after which time application of heat was continued for five to ten minutes. This treatment, which was employed daily for six weeks, resulted in complete recovery.

Discussion

It is generally understood that the value of a fungistatic medicament depends on its ability to kill fungus spores. The preparations used in the clinical cases described above undoubtedly possess fungistatic effect *in vitro*. In order to exhibit this activity *in vivo*, the fungicide must be capable of reaching the fungus by penetrating the basal portion of the hair follicle. Kligman and Anderson[3] working with *M. audouini* achieved satisfactory *in vitro* fungicidal action by using 10% formalin in gas-

Fig. 3. Microsporum canis infection in a dog. Generalized scaling crust formation, and dermatitis are visible signs of disease of the feet.

Fig. 3A. Clearly defined areas of alopecia, scaling and lymphangitis are evident around the nasal and oral regions.

eous form. An attempt to apply this information to clinical advantage failed. These investigators concluded that solution of this problem probably depends less on discovery of new fungicides than it does on development of means to insure penetration.

The iodine used in treating case 3 is known to be fungistatic and, to some extent, fungicidal for the ringworm fungus. Apparently, the use of heat upon application of iodine induces some vaporization of this drug which legitimately attributes to increase of penetrating action, since it is known generally that vapor forms are rather easily absorbed.

Lewis and Hopper[5] studying the mechanism of cure in *M. canis* infection observed that spontaneous recovery depends upon development of inflammatory reaction. This finding undoubtedly questions the therapeutic value of the drugs employed in case 3. On the other hand, if the presence of inflammatory reaction should create a favorable prognostic end, the result of case 1 might be contradictory to this conclusion. However, immaturity of the animal may have been associated with insufficiency of the immune body-producing mechanism.

The purpose of preparations used in case 2 was twofold: (1) To induce fungicidal effect, and (2) to induce inflammatory reaction. The superimposed inflammatory reaction apparently contributed to immune response increase on the part of the host, which favorably influenced the course.

Conclusion

Three cases of dermal canine infection with *Microsporum canis* were artificially transmitted to laboratory animals by applying infected hairs to the scarified skin. Naturally and experimentally-produced lesions consisting of partial or total alopecia were accompanied by inflammatory reactions varying from low-grade folliculitis to marked erythema, tissue edema, and kerion. Although the real value of treatments used could not be estimated from the small number of cases observed, it appears that, under the conditions of these tests, iodine and mercury are effective fungicides.

REFERENCES

1. Benham, R. W., Laboratory Procedure in Diagnosis of Fungous Diseases. Proc. New York State A. Pub. Health Lab., 24:69, 1945.

2. Georg, Lucille K., The Diagnosis of Ringworm in Animals. *Vet. Med.*, 49:157, 1954.

3. Kligman, A. M., and Anderson, W. W., Evaluation of Current Methods for the Local Treatment of Tinea Capitis. *Jour. Invest. Dermat.*, 16:155, 1951.

4. Kligman, A. M., and Rosenweig, W., Studies with New Fungistatic Agents. *Jour. Invest. Dermat.*, 10:59, 1948.

5. Lewis, G. M., and Hopper, M. F., Ringworm of the Scalp. Mechanism of Cure of Infection Caused by *Microsporum lanosum*. *Arch. Dermat. and Syph.*, 36:1194, 1937.

6. Strickler, A., Tinea Capitis. Its Treatment with Special Iodine and Dilute Acetic Acid. *Jour. Am. Med. Assn.*, 132:65, 1946.

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Fig. 4. Microsporum canis infection in a dog. Areas of alopecia and scaling limited to two digits of a foot.

A Clinical Evaluation Of Meperidine Hydrochloride As A Preanesthetic Agent In The Cat

WILLIAM D. CARLSON,* D.V.M., Fort Collins, Colorado

THE purpose of this study was to determine the effectiveness and the practicability of meperidine hydrochloride (demerol)® used as a preanesthetic drug in cats. It has been the writer's experience that a preanesthetic agent in cats could, at times, be desirable not only to reduce the amount of anesthetic used, but to help make the patient more manageable for the administration of an intravenous anesthetic agent.

Review of Literature

Interest in this subject was stimulated by the preliminary investigation of Booth and Rankin[1]. They studied this drug on an experimental basis and considered it safe for use in cats. Demerol had been used in cats prior to this study[2,3,4,5,6,7,8]. There has been no extensive clinical survey recorded in the available veterinary literature.

Booth and Rankin have shown that a satisfactory dosage range of demerol in cats was 5 to 10 mg. per kg. body weight (approximately 2.5 to 5 mg. per lb.). The drug produced an analgesic-like effect which made the majority of animals more tractable and easily handled. The animals did not demonstrate marked depression at any time. It was cautioned, however, that amounts exceeding this dosage range caused excitation, whereas amounts under the given range had no effect.

Methods

Animals were selected at random from clinical patients requiring anesthesia at the Colorado A. & M. small animal clinic. A total of 78 cats were preanesthetized with demerol, 45 were given 5 mg. per lb. subcutaneously, and 33 were given 2.5 mg. per lb. intramuscularly. The latter route was used to reduce the time between the administration of the preanesthetic and the general anesthetic agents. The lower dosage was used, because the rate of absorption was increased by the intramuscular route of administration. The control group consisted of 16 cats given only intravenous sodium pentobarbital.

Results

The three groups were compared as follows: (1) The manageability of the cat during administration of the general anesthetic, and (2) the dosage of sodium pentobarbital necessary to induce surgical anesthesia.

Effectiveness of Demerol as a Sedative. Thirty-two of 45 cats (71%) given 5 mg. per lb. of demerol subcutaneously (table 1), and 23 of 33 cats (70%) given 2.5 mg. per lb. of demerol intramuscularly (table 2) exhibited no resistance upon administration of the general anesthesia†. In the control group, 8 of 16 cats (50%) resisted administration of the general anesthesia (table 3). Demerol did not eliminate the excitement stage occasionally encountered in the induction of general anesthesia.

TABLE 1. The Effectivness of Demerol as a Sedative Using a Dosage of 5 mg. per lb. Subcutaneously

	Time interval between preanesthetic and anesthetic.							
	15 min.	30 min.	45 min.	1 hr.	1½ hr.	2 hr.	3 hr.	Total
No. of animals in which demerol was effective	0	1	5	11	6	5	4	32
No. of animals in which demerol was not effective	1	4	0	1	0	3	4	13
Total	1	5	5	12	6	8	8	45

An interesting observation was that four Siamese cats given demerol showed a marked

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®Winthrop-Stearns, Inc., New York, N. Y.

†All intravenous injections associated with this study were made by senior veterinary students under the supervision of members of the small animal clinic staff, Colorado A. & M. College Veterinary Hospital.

TABLE 2. The Effectiveness of Demerol as a Sedative Using a Dosage of 2.5 mg. per lb. Intramuscularly

	Time interval between preanesthetic and anesthetic.							
	15 min.	30 min.	45 min.	1 hr.	1¼ hr.	2 hr.	3 hr.	Total
No. of animals in which demerol was effective	4	12	2	0	2	2	1	23
No. of animals in which demerol was not effective	1	6	3	0	0	0	0	10
Total	5	18	5	0	2	2	1	33

reduction in resistance to handling. They were all very excited before administration but were quite tractable afterwards.

Effectiveness of Demerol in Reducing the Dosage of Sodium Pentobarbital. The dosage of sodium pentobarbital required to anesthetize each cat was tabulated (table 4). Following the subcutaneous administration of 5 mg. per lb. of demerol, the average dosage of sodium pentobarbital was 1 gr. per 6 lb. of body weight. Following the intramuscular administration of 2.5 mg. per lb. of demerol, the average dosage of sodium pentobarbital used was 1 gr. per 7 lb. of body weight. The average dosage of sodium pentobarbital without the preanesthesia was 1 gr. per 5 lb. of body weight.

TABLE 3. Resistance of Cats Without Preanesthetic to the Administration of Intravenous Sodium Pentobarbital (Control Group)

Number of animals not resisting administration	8
Number of animals resisting administration	8
Total	16

Conclusions

Demerol was found to be a safe drug for use in cats. As a preanesthetic it rendered only 20% of the patients more manageable when a general anesthesic was administered. However, the drug appeared to be desirable in excitable animals. On the average, preanesthetic narcosis reduced the amount of sodium pentobarbital necessary for anesthesia, though it caused a marked individual variation in the dosage of the intravenous agent employed. In general, demerol as a preanesthetic in cats was disappointing, its advantages being slight over its disadvantages; therefore, the advisability of its routine use appeared to be questionable. In selected cases (*i.e.* excitable, nervous cats) it should prove a valuable adjunct to anesthesia, but its use should be limited to such animals.

Acknowledgment

Dr. L. C. Moss, professor and head, Department of Medicine, Colorado A. & M. College. Dr. N. H. Booth, Department of Physiology and Pharmacology, Colorado A. & M. College for his advice on pharmacological problems encountered in this investigation. The veterinary students in the class of 1953-54, Colorado A. & M. College, all of whom assisted in the study of this drug.

REFERENCES

1. Booth, N. H., and Rankin, A. D., Evaluation of Meperidine Hydrochloride in the Cat. *Vet. Med.*, 49:-249, 1954.

2. Eisleb, O., and Schaumann, O., Dolantin, ein neuartiges Spasmolytikum und Analgetikum. *Deutsche med. Wchnschr.*, 65:967, 1939, (cited by Booth and Rankin).

(Continued on page 233)

TABLE 4. Comparative Dosages of Sodium Pentobarbital Used to Anesthetize Each Cat

Preanesthetic and anesthetic agents used	Dosage of Sodium Pentobarbital 1 gr/ 3 lb.	1 gr/ 4 lb.	1 gr/ 5 lb.	1 gr/ 6 lb.	1 gr/ 7 lb.	1 gr/ 8 lb.	1 gr/ 9 lb.	1 gr/ 10 lb.	1 gr/ 11 lb.	1 gr/ 12 lb.	Total
No. of animals given demerol 5 mg./lb. subcutaneously before Na. pentobarbital	3	6	8	11	8	2	2	0	1	0	41*
No. of animals given demerol 2.5 mg./lb. intramuscularly before Na. pentobarbital	1	6	4	6	2	2	3	1	3	5	33
Na. pentobarbital alone with no preanesthetic	0	4	9	2	1	0	0	0	0	0	16
Total	4	16	21	19	11	4	5	1	4	5	90

*Three cats were given ether anesthesia after demerol, one cat was given sodium pentothal, total 45.

Neomycin In Veterinary Practice

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Anniston, Alabama

NEOMYCIN, one of the newer broad-spectrum antibiotics, possesses antibacterial activity against a variety of Gram-positive and Gram-negative organisms. The sulfate salt is advantageously stable not only to the action of heat, but to the actions of microorganisms, products of bacterial growth, gastrointestinal ferments, foods, and alkaline pH. The dry form is indefinitely stable, while ointment and fluid preparations are stable for long periods. Neomycin is nontoxic when administered orally, or applied topically.

This report presents clinical experiences with this antibiotic in various common canine and bovine diseases and conditions.

A fluid neomycin preparation consisting of neomycin sulfate, 300 mg.; kaolin, 90 gr.; pectin, 2 gr.; suspended in methlycellulose, 1.25%, per fluid ounce, was administered orally in various gastrointestinal infections. Canine patients were given this preparation for: Diarrheas associated with parasitic infestations, non-specific gastroenteritis, gastroenteritis associated with canine distemper complex, and gastritis. Only the treatment of infectious calf dysentery, the so-called "calf scours" was treated with the fluid in bovine patients.

Thirty-five canine patients were treated with the neomycin-kaolin-pectin combination. Of these, 30 fully recovered, as evidenced by the presence of normal bowel movements. Two dogs showed only temporary improvement; diarrhea returned after the drug was discontinued. In three cases, there was no improvement. One of the latter, a patient with peracute infectious hepatitis, died within 48 hours after being presented for treatment.

The dosage of the neomycin-kaolin-pectin preparation varied according to weight of the dog and the observed response to treatment, so that no careful measurement was made. Dogs treated received from ¼ to 3 oz. t. i. d. according to size. Occasionally it was necessary to either increase the dose given, or to prolong treatment. Most animals responded in three to four days.

*Now at Royal Oak Veterinary Hospital, Royal Oak, Michigan.

The drugs referred to in this article are products of The Upjohn Company, Kalamazoo, Mich.

Eight calves were treated for calf scours, with seven recovering. In the uncomplicated cases, neomycin-kaolin-pectin combination proved to be a near specific. Dosage ranged, again according to size, from 2 to 10 oz., given two or three times daily. The larger dose, was given to the one case that failed to respond and this calf not only had a diarrhea but also exhibited signs of photosensitization and "pink eye". Management practices in this case were extremely poor.

Neomycin sulfate, as 0.5 gm. tablets, also was employed in canine gastroenteric conditions. The amount needed to effect results was not known so that an arbitrary dosage of one tablet two or three times daily was given to the average size dog. It was found that dogs of average size usually responded to one 0.5 gm. tablet b. i. d. If response was not apparent within 48 hours, the dosage was increased by one tablet daily. None of the cases received more than 2 gm. daily. Of the ten cases covered by this report, six fully recovered in an average of 3½ days, three demonstrated only temporary improvement, and the tenth died overnight. Two of the three dogs which showed only temporary improvement suffered from a persistent chronic colitis. One of these, had been affected for nearly six months. This dog finally recovered following a seven day treatment with 100 mg. of erythromycin b. i. d. The other had numerous, daily, mushy, fecal passages for 2½ weeks preceeding treatment. Following treatment, bowel movements remained normal for nearly two weeks when the condition recurred. Various treatments were tried with only indifferent results for the next three weeks. Following the use of sulfathalidine (1 gr. per lb. body weight) given b. i. d. for one month, recovery was affected that has held for several months to date. The third dog suffered acute gastritis that necessitated the use of sedative tablets to stop vomition.

Neomycin With Cortisone

A combination of neomycin sulfate, 5 mg. per gm., and cortisone acetate, 15 mg. per gm. was evaluated in ophthalmic conditions. This preparation possesses not only the anti-

bacterial effects of the antibiotic, but the anti-inflammatory effects of the cortisone acetate. Previous reports have indicated effectiveness of such preparations in keratitis, corneal injury, conjunvtivitis, blepharitis, and keratoconjunctivitis. The resolution of corneal injuries in particular is enhanced. It is characterized by deceased vascularization and scarring.

The following table illustrates results obtained in 21 canine and feline cases. Therapy with intramuscular cortisone acetate, subcutaneous foreign protein, and vitamin A orally was applied concurrently.

TABLE I. Results of Neomycin-Cortisone Ophthalmic Ointment Therapy in Ocular Conditions in Dogs and Cats

Condition	No. cases	Response		
		Rec.	Imp.	No Effect
Conjunctivitis	11	5 (45.4%)	3 (27.2%)	3 (27.2%)
Ophthalmitis associated with the canine distemper complex	2	.....	2 (100%)	.....
Keratitis	6	1 (16.6%)	4 (66.2%)	1 (16.6%)
Corneal ulcer	2	1 (50%)	.....	1 (50%)
Totals	21	7 (33%)	9 (43%)	5 (23%)

Neomycin Topically

Neomycin sulfate powder, in a special diluent pure lactose base, has been applied by insufflation to certain surgical wounds. The preparation, being highly soluble, goes into solution in a minimum of tissue fluid. This results in the even distribution of the powder throughout the wound. There is no undesirable drying of the site and there is no foreign body reaction from undissolved powder. Surgical wounds heal rapidly and postoperative suture infection is eliminated. In grossly infected wounds, neomycin is at least as clinically effective as most of the currently employed antibiotics.

One operation particularly benefited by neomycin powder is ear-cropping. Healing is rapid, thus eliminating excessive scratching and head shaking. Infection of the sutured edges of the ears is rare.

Neomycin powder also has been useful in eye infections of large and small animals. In refractory or sensitive animals, the powder may be insufflated from a distance.

Neomycin cream, containing 5 mg. neomycin sulfate per gram, may be used in wound therapy or in cases of otitis externa. In our experience, the use of neomycin cream in the treatment of otitis has not been as successful as expected. However, the cream certainly is indicated in those cases that have proved refractory to other treatments. The near specific action of neomycin against Pseudomonas sp. warrants its use in otitis because of the apparently high number of ear canal infections due to Pseudomonas organisms. The only real failures with this preparation have been in grossly infected wound conditions.

Neomycin sulfate powder suitable for parenteral use has been employed in bovine and canine mastitis, bovine pyometritis, and endometritis.

Case 1. A cow, demonstrating an acute exacerbation of mastitis subsequent to freshening, was treated with 0.5 gm. of neomycin sulfate sterile powder by intramammary infusion. The neomycin was given on the third day of treatment after local heat applications and antibiotic salves, injected through the teat canal, had failed to bring about sufficient reduction of swelling and inflammation. The next day the quarter had reduced to nearly normal size. Inflammation was relieved.

Case 2. A Hound bitch was examined for the cause of the loss of two previous litters. The pups began to die at approximately two weeks of age. No external cause could be found, and there was no evidence of internal pathology. Cultures of the vagina, in the region of the cervix, and of the milk of the dog were taken. The laboratory revealed Pseudomonas organisms in the milk. At the time of examination the bitch had lost her last litter about one week previously. Neomycin was administered intravenously for five days. There was no decrease in Pseudomonas organisms on subsequent culture. It must be emphasized, however, that little is known concerning intravenous neomycin therapy.

Table II shows the results of investigational use of parenteral neomycin in pyometritis and endometritis of dairy cattle. The neomycin sulfate was put into solution with 30 cc. of water, normal saline, or 5% dextrose solution. This mixture was then administered intrauterinely via catheter. Of seven cows treated, five (71.4%) were successfully bred following treatment. In view of the history of the reported cases, this is considered to be an excellent recovery rate. Neomycin therapy appears promising in these conditions. Under the remarks column of table II the term "still open" refers to cows that have been bred one or

more times since treatment and still are not pregnant. These cows (no. 2 under pyometritis and no. 6 under endometritis) were bred each time they came in heat following treatment. "Previous services" refer to the number of times the cow was bred before the treatment was given. Generally these cows were bred monthly, but some of them skipped one or more heat periods and were bred only when the owner noticed them in heat. Whether these cows were missed or whether they were early aborters due to the infection present could not be determined.

Summary

Reports concerned with the use of various neomycin preparations in veterinary practice have been presented. Gastrointestinal conditions, ophthalmic and topical infections, mastitis and endometritis have been treated successfully. The treatment of gastrointestinal conditions, in both small and large animal practice, is successful particularly with neomycin. From this investigation it would seem that neomycin has unique therapeutic potential in veterinary practice.

TABLE II. Results of Intrauterine Therapy Parentral Neomycin Powder In Bovine Pyometritis and Endometritis

	Case no.	Intrauterine dose gm.	No. treat.	Concurr. Treat.	Recovery Phys. Exam	Recovery Conceived	Remarks*
Pyometritis	1	0.5	1	None	Yes	No	See Cow #1, endometritis
	2	0.5	2	None	No	No	
				Intrauterine 100,000 U. penicillin with second	Yes	No	Still open
Endometritis	1	None	1	Strepto. 1 gm. intrauterine	Yes	Next service	5 previous services
	2	0.5	1	None	Yes	Yes	Treated A. M. & bred in P. M. 5 previous services
	3	0.5	1	100,000 U. penicillin intrauterine	Yes	Next service	7 previous services
	4	0.5	1	None	Yes	Yes	Treated 45 min. after breeding 7 previous services
	5	0.5	2	None	Yes	Next service	4 previous services
	6	0.5	1	100,000 U. penicillin intrauterine	Yes	No	Still open

*See text for explanation.

REFERENCES

1. Waksman, S. A., Neomycin, New Brunswick, N. J., Rutgers University Press, 1953.

2. Drury, A. R., Evaluation of Neomycin Sulfate In Treatment of Bovine Mastitis. *Vet. Med.*, 47:407 (Oct.), 1952.

3. Braeutigam, H. M., Neomycin In Veterinary Practice. *N. Am. Vet.*, 35:26 (Jan.), 1954.

4. McCarty, R. T., Neomycin Sulfate Treatment of *Salmonella derby* Infection In Geese. *Jour. Am. Vet. Med. Assn.*, 122:386 (May), 1953.

5. Schweinburg, F. B., *et al.*, Effect of Oral Neomycin On Normal Intestinal Flora of Dogs and Man. *Proc. Soc. Exp. Bio. Med.*, 79:335 (Feb.), 1952.

6. Dickson, R. S., Neomycin Sulfate In *Salmonella dublin* Infection of Calves. *Vet. Med.*, 49:421 (Oct.), 1954.

7. Dickson, R. S., Neomycin Sulfate In Arizona Paracolon Infection of Calves. *Vet. Med.*, 50:143 (Mar.), 1955.

8. Poth, E. J., *et al.*, Neomycin: A New Intestinal Antiseptic. *Tex. Rep. Bio. Med.*, 8:353 (Fall), 1950.

9. Newberne, P. M., Treatment of Anomalies of The Eye In South American Chinchilla. *Vet. Med.*, 48:126 (Mar.), 1953.

10. Davidson, J. L., Neomycin Sulfate In Veterinary Dermatology and Ophthalmology. *Vet. Med.*, 48:239 (June), 1952.

11. Dicek, E. K., Neomycin: An Adjunct In Veterinary Surgery. *Jour. Am. Vet. Med. Assn.*, 124:105 (Feb.), 1954.

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Meperidine Hydrochloride in the Cat

(Continued from page 230)

3. Duguid, A. M. E., and Heathcote, R. St. A., The Pharmacological Action of Ethyl Methylphenylpiperide-carboxylate. *Quart. Jour. Pharm. & Pharmacol.* 13:318, 1940.

4. Kiessig, H. J., and Orzechowski, G., Uber die zentralen Wirkumgen des "dolatins." *Schmerz Narkose-Anaesthesia*, 14:41, 1941, (cited by Booth and Rankin).

5. Barlow, O. W., and Lewis, J. R., Toxicology and Addiction Liability of Meperidine (Demerol) in Experimental Animals. 103:147, 1951.

6. Climenko, D. R., 1-Methyl-4-Phenylpiperidine 4-Carbonic Acid Ethyl Ester (D-140, Demerol): A Pharmacologically Active Substance with Atropine-like and Morphine-like Properties. Federation Proc., 1:15, 1942, (cited by Booth and Rankin).

7. Mayer, K., Demerol Hydrochloride as a Sedative for Cats. *N. Am. Vet.*, 26:477, 1945.

8. Archer, R. K., Pethidine in Veterinary Practice. *Vet. Rec.*, 59:401, 1947.

Treating Dermatoses in Small Animals with Benzalkonium-Fuchsin Solution

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This report deals with the treatment of small animal dermatoses with a mixture of benzalkonium chloride, basic fuchsin, and benzocaine in 20% isopropyl alcohol.* It is comparable to a carbol-fuchsin solution in which the phenol has been replaced with benzalkonium chloride. The benzalkonium chloride has surface active properties which improve penetration and fungicidal and antibacterial properties as well[1]. The basic fuchsin has marked antifungal properties and has been reported to have a mild epithelial stimulant action[2]. Benzocaine serves as a mild antipuritic and anesthetic, relieving pain and lessening the likelihood of scratching. There appears to be a synergistic action when these drugs are combined[3].

The treatment of dermatoses in small animals commonly requires agents that are effective against bacteria, fungi, and parasites. Due to the expense and time involved, veterinarians usually do not attempt to determine the etiology of the various skin involvements except for microscopic examination for mites and the detection of certain fungi by their fluorescence under an ultraviolet light.

Benzalkonium-fuchsin solution exhibits outstanding efficacy in the treatment of localized bacterial and fungal infections. It is quite effective against ringworm and particularly effective against most eczemas of undetermined origin. Of particular importance is its effectiveness in the treatment of dermatoses of cats. Most ointments, creams, and oils are quickly licked off by these animals, but the rapid penetration and quick drying action of this agent eliminates this hazard. No untoward side reactions were observed in any of the cases of dermatoses of cats treated.

Clinical Study

In a series of 52 cases of dermatoses in both dogs and cats, a favorable therapeutic response was obtained with benzalkonium-fuchsin solution in 46. The remaining six were complicated by mange infestation which were improved in some instances, but supplemental medication was required to effect resolution. All of the fungus infections, nonspecific infections of both ears and feet, and particularly ringworm in cats responded satisfactorily. The liquid was applied once daily to all patients for one week. Hair was removed prior to treatment for ringworm in cats. In some cases treatment was continued over an extended period with applications at two to three day intervals.

Comment

This study indicates that benzalkonium-fuchsin solution with benzocaine is well suited for treatment of routine cases of dermatoses in dogs, and especially cats. Its broad therapeutic action is well suited for use in small animal dermatoses of unknown etiology. It is not effective alone in parasitic mange dermatoses, but should be supplemented with antibiotics and medicated sulfur baths. Benzalkonium-fuchsin solution dries rapidly and can be applied daily for five days, then at intervals of two to three days for several additional applications. Repeated daily applications are not irritating to either dogs or cats. In home dispensing, clients should be warned to hold the animal for a few minutes after the solution is applied to allow it to dry completely, otherwise the dye solution is apt to be rubbed off on furniture. The hair about the lesions should be clipped in all cases prior to application. Benzocaine included appears to allay most itching immediately. The preparation has staining properties due to its basic fuchsin content which serves to mark clearly the areas of application.

Summary

Fifty-two dogs and cats with a variety of dermatoses were treated with a mixture of benzalkonium chloride, basic fuchsin, and benzocaine in 20% isopropyl alcohol. A favorable therapeutic response was obtained in 46 cases of fungus infections, nonspecific infections of both ears and feet, and ringworm in cats. Six cases of generalized demodectic mange did not respond but required supplemental treatment. Treatment consisted of application as indicated by the clinical response.

REFERENCES

1. New and Non Official Remedies, 1954, p. 81.
2. United States Dispensatory, 24th ed., p. 1439.
3. O. H. Miller, Ph.D., Unpublished data.

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A.A.H.A. Annual Meeting

Detroit, Mich., May 4-7, 1955

*The solution used in this study was coside® as supplied by CKD Products, Monrovia, Calif.

Fractures Of The Distal End Of Humerus In Small Animals†

W. O. BRINKER, D.V.M., M.S., East Lansing, Michigan

THE distal end of the humerus is quite susceptible to injury and fractures. Spiral fractures[1] are usually the result of rotational strains, oblique and transverse are often the result of angulating strains, and comminuted fractures frequently result from direct crushing.

Three important principles in the treatment of fractures in this region are: (1) Good alignment, particularly if articular surfaces are involved. Restoring smooth, undamaged, articular surfaces before movement is begun is of prime importance. (2) Avoid using metallic bodies which pierce the joint capsule or articular surfaces. (3) Uninterrupted fixation.

Open reduction[2] frequently is indicated to obtain satisfactory apposition of bones. To expose the upper two-thirds of the lateral aspect of the humerus, the skin incision is made longitudinally over the anterior-lateral surface of the bone. Reflect the brachiocephalicus muscle anterior and the brachialis posterior. The radial nerve circles around the lower third of the humerus and should be avoided.

The lower third can be exposed by making a skin incision along the lateral epicondyle and extending upward along the lateral border of the supracondyloid ridge. The triceps are reflected posterior exposing the extensor muscles of the forearm. Separation should be made with caution so that the radial nerve is not subjected to injury.

The medial surface of the humerus can be exposed readily by a skin incision beginning at medial epicondyle and extending upward parallel with the shaft of the humerus. The fascia is incised exposing the medial head of the triceps, posterior, and the biceps anterior. Between these two muscles are located the brachial vessels and several nerves. By blunt dissection these vessels and nerves are reflected posteriorly along with the medial head of the triceps. This approach can be used to expose the lower two-thirds of the humerus.

Among the most common fractures encountered are: (1) Distal end with forward displacement, (2) distal end with backward displacement, (3) transverse in the region of the olecranon fossae, (4) lateral condyle and epicondyle, (5) intercondyloid T or Y fracture.

Fractures of Distal End with Forward Displacement

Overriding at the fracture site is the result of spastic contraction of the triceps, biceps, and brachialis. Forward displacement of the distal fragment is due to the pull of the extensors and flexors of the forearm.

Fixation usually can be accomplished by intramedullary pinning. If the distal end is short, the pin can be directed into the center of the medial epicondyle for added stability. Additional fixation, such as Thomas splint, may be indicated to avoid rotation. Good alignment of fragments is important in order that flexion and extension are not limited.

Fractures of Distal End with Backward Displacement

The line of fracture is usually oblique, running from the front of the bone upward and backward. The distal fragment is displaced upward and posterior to the oblique break with contraction of the surrounding muscles.

Fixation usually can be accomplished in the same manner as with forward displacement. This type of fracture is also more adaptable to the use of a Thomas splint.

Transverse Fractures in Region of Olecranon Fossa

There is usually a minimum of overriding in this location. Alignment often can be accomplished without open reduction.

In many cases the use of an intramedullary pin in the fixation of this type fracture is ideal as immobilization can be accomplished without sacrificing elbow movement. This is accomplished by directing the intramedullary pin down the center of the medial epicondyle.

†Presented at the 20th annual meeting, American Animal Hospital Association, Minneapolis, Minn., May 6-9, 1953.

Insertion in the above manner will result in slight lateral displacement of the distal end, however, slight lateral displacement, which is unaccompanied by tilting, is of little functional significance.

Fractures of Lateral Condyle and Epicondyle

The fragment usually is angulated outward and backward due to the pull of the extensor muscles of the foreleg.

Early reduction and fixation are of prime importance. Insertion of a pin through the condyles with attachment to the proximal fragment of the humerus by use of Kirschner clamp and bars has given the most encouraging results.

Intercondyloid T or Y Fractures

Intercondyloid fractures of humerus are sustained more often by mature animals, and often are due to direct falls with the joint in the extended position. After fracture the triceps, biceps, and brachialis pull the olecranon upward, wedging the condyles upward and laterally.

Open reduction is difficult and often results in added adhesions and contraction of the capsule, thus contributing to partial loss of movement or permanent stiffness.

Application of countertraction to overcome spastic contraction of the muscles is helpful in obtaining reduction. Use of condyle clamps are quite often useful and necessary in order to insert a pin through the condyles. Anchoring this pin to two diagonal pins placed in the upper fragment by use of the Kirschner clamps and bars has given the most favorable results.

Summary

Sites for open reduction, types of fracture involving the distal end and displacement of fragments were briefly covered. Methods of fixation were suggested.

REFERENCES

1. Watson-Jones, Reginald, Fractures and Joint Injuries. 3rd ed., Baltimore, Md., Williams and Wilkins Co., 1946. Vol. II:463.

2. Brinker, W. O. Fractures. Canine Surgery. 3rd ed., Evanston, Ill., American Veterinary Publications, Inc., 1952., pp. 562-565.

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Any disease which causes anemia, dehydration, or severe debility can be treated advantageously by administering whole blood intravenously.—*John W. Carey, D.V.M.*

"Hospital Service" Theme for A.A.H.A. Meeting

Improving hospital service for small, pet animals will be the principal discussion for the 1955 annual convention of the American Animal Hospital Association which will meet in the Hotel Statler, Detroit, Mich., May 4-7. All phases of the problems will be studied by comparison of methods now employed with

Dr. L. K. Firth

those to be demonstrated which stress efficiency of business procedures including: Arrangement for conservation of time and motion, records (case and financial), employee relations, efficient time saving equipment, and many other considerations. Dr. L. K. Firth, Canton, Ohio, program chairman, and his Committee have arranged for discussions to answer questions about which practitioners so frequently inquire.

The professional portions of the program will feature well known surgeons who will perform selected technics for television demonstration. Also mentioned in advance notices are care and management in disease and maintenance of health of some lesser important pets, including birds.

Local arrangements have been made for rest, relaxation, and entertainment, featuring a golf tournament on May 3, "Chuck Wagon" mixer party, and the President's Reception and Dance.

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True research and progress in the United States are synonymous, not because research has been done but because research findings have been put to work.—*A. E. Darlow, Jour. Ani. Sci., Feb. 1955.*

Rabies Control Activities†

Extent of the Problem. The over-all reported incidence of animal rabies in the United States during the past year is in the order of 8,000 cases. The losses in livestock, approximately 2,000 reported deaths (grossly underreported), have been staggering . The disease is present throughout the country with the exception of New England and the upper Rocky Mountain Northwest region.

The extent of public health aspects of the rabies problem is not measured so much by the relatively small number of human deaths in the United States as by the 50,000 human exposures annually which require the expensive, painful series of 14 to 21 daily vaccine treatments, a therapeutic-prophylactic regime involving greater professional medical care than most infectious diseases. Added to this are the 500,000 people each year who suffer terrifying mental anguish following bites by dogs in areas of endemic rabies. Another point of vital concern is the preponderance of human rabies deaths in children. Studies have shown (see VETERINARY MEDICINE, 50:138 [Mar.], 1955) that 52% of the deaths occur in the age group under 15 years.

Resume of Current Progress. The Communicable Disease Center, U. S. Public Health Service, has assisted actively in the establishment of rabies control activities in 22 state health departments. Improved rabies control technics have been developed in detail for operation at the local level involving the basic three-point program of canine immunization, stray dog elimination, and reduction of wild animal vectors.

The Center has completed experiments and field trials establishing the superiority of modified live virus rabies vaccines for periods of at least 3¼ years, as well as findings that pups can be immunized successfully as early as two months of age. This has made possible a policy of canine immunization which is obviously more practicable than that of annual vaccination. Thus, in areas which have successfully eliminated the disease but are faced with the constant danger of its reintroduction, we can visualize a prophylactic regime somewhat similar to smallpox vaccination in human populations, by vaccinating dogs with chicken embryo (Flury strain) vaccine at two months and one year of age, followed by a booster vaccination every three to four years. It should be emphasized, however, that this procedure by no means precludes the necessity of carrying out intensified canine immunization campaigns in areas of enzootic or epizootic rabies whenever indicated. Furthermore, it is important that vaccination programs be made annually to cover the new crops of dogs each year.

Program Plan

The program for 1956 is being planned along three broad lines, designated as Operational Services to the States, Training, and Investigations.

1. *Operational Control Services to States.* This phase of the program will utilize both headquarters and field staff to answer calls on epidemic aid, to develop a surveillance program for reporting and analyzing pertinent epidemiological information on human-animal rabies deaths, and to discharge the growing responsibilities for consultation to the states by rendering technical assistance in control practices when requested. The extent of this technical assistance follows the established policy of consultation and planning of overall programs, and does not embrace actual canine vaccination by Public Health Service personnel.

2. *Training.* The training activities planned will include continuation of the in-service training of the CDC veterinary officers, the laboratory diagnostic refresher courses for state and local personnel, and the sponsoring of regional rabies conferences throughout the country. New activities planned are the preparation of a complete manual on rabies control, the holding of periodic one-week courses in rabies control operations, and the preparation of selected types of educational material.

3. *Investigations.* Applied research problems in the prevention of human rabies will include the search for methods and materials for the effective local treatment of bite wounds, and antibody studies in human populations for comparative evaluation of newer prophylactic inoculation regimes such as high passage (HEP) chicken embryo and serum plus Semple vaccine.

Investigations directed toward control of the disease in canine populations will include improved canine vaccination, pathogenesis of rabies virus in the host, studies in susceptibility and infectiousness.

The strides made with rabies control in dog populations now has begun to emphasize

†Abstracted from a presentation of Dr. Ernest S. Tierkel, Chief, Rabies Control Activities, Communicable Disease Center, Public Health Service, U. S. Department of Health, Education, and Welfare, Atlanta, Ga.

the importance of wild animals in the spread of the disease. There are huge gaps in our knowledge of the epidemiology of disease in wildlife, and well planned research in this field is essential to develop intelligent and effective control technics. The program will embrace investigations in the virtually untapped province of sylvatic rabies.

The necessity for attacking the wildlife rabies problem is threefold. Of primary significance are the reported direct exposures of man by rabid wild animals, particularly in rural and suburban areas of the country. Secondly, epidemiological observations of rabies outbreaks indicate that the disease in foxes and skunks sooner or later spills over into the domestic canine population where the hazard is increased because of man's closer association with dogs. Finally, if our aim is to be effective control and eventual eradication or reduction to a controllable minimum, the reservoir of the virus in the country's wild fauna necessarily must be included in scientifically devised control operations.

These studies will include the fox and skunk population density required to support rabies epizootics, bat rabies studies to determine the role of bats in the spread of the disease, studies on natural immunity, carrier state, unknown reservoirs, bizarre modes of transmission, and studies on the velocity of movement of infected wildlife populations.

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New Antibiotic Effective in Pulmonary Tuberculosis

Cycloserine, one of the newer antibiotics appears to have favorable antituberculosis action against the pulmonary type in man. The daily dose used in trials was 1 to 1.5 gm. for from six weeks to four months. Because of certain neurologic symptoms, it was necessary to discontinue treatment in 11% of patients. Impressive results have been observed in cases not amenable to surgery. Many of the treated patients were affected with chronic pulmonary tuberculosis, and several of those treated had failed to respond satisfactorily to prior antimicrobial therapy.

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Corneal inflammatory processess accompanied by pain are relieved by topical application of cortisone acetate in 0.5 to 2.5% solution.—*G. B. Schnelle, V.M.D.*

The Hamster

Samuel M. Poiley of the National Institute of Health, supplies directions for housing, handling, feeding, breeding, sanitation, and laboratory use of the Syrian (golden) hamster, a comparatively new addition to laboratory animals*. Its usefulness in some fields of medical research has been demonstrated fully. Newspaper stories of the profits to be made by raising hamsters have been overly optimistic and have resulted in a surplus of these rat-like rodents.

In hamsters, menarche occurs at 27 to 42 days of age, gestation lasts about 16 days. The young are weaned at three weeks of age and the dam rebred immediately. If the mother is molested before the young are one week of age, even if it be only to clean the cage, she usually devours her young. The average number in a litter of hamsters is about seven. In the wild state, litters are born in burrows about eight feet below the surface. The young can subsist on solid food after they are eight days of age, but the dam will not permit them to leave the nest until 14 days after parturition.

At the National Institute of Health, hamsters do well on a diet of pellets composed of 15% pure oat groat; 30.5% pulverized no. 1 whole wheat; 40% alfalfa meal, U. S. no. 1 suncured with a carotene content of not less than 60 gamma per gm.; 13% soybean oil meal, high temperature processed and containing not less than 44% protein; 0.25% irradiated yeast; 0.25% sodium chloride iodized, and 1% calcium carbonate. Eight ounces of cold, pressed, wheat germ oil is added to each ton of the foregoing mixture.

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Research by a California scientist suggests close relationship of canine distemper virus and the causative agent of common colds in man. Distemper virus has been neutralized with human convalescent serum in chick embryo culture and in ferrets.

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Neither adrenal cortical steroid nor ACTH possesses curative value in arthritis. During the period of administration marked relief may be noted, but when treatment is stopped signs of disease again appear.—*John E. Martin, V.M.D.*

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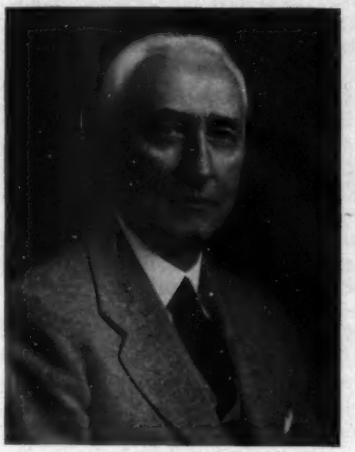
*The Care and Breeding of Laboratory Animals, edited by Edmond J. Farris, John Wiley and Sons, Inc., New York, N. Y.

Dean Emeritus
Dr. R. R. Dykstra Honored

The Dykstra Veterinary Hospital at Kansas State college is named in honor of Dr. R. R. Dykstra, dean emeritus, who is Department Editor of VETERINARY MEDICINE. Doctor Dykstra, who received his D.V.M. degree from Iowa State College in 1905, joined the Kansas



Dr. R. R. Dykstra, Dean Emeritus, Kansas State College, School of Veterinary Medicine.

State College faculty in 1911 and in 1919 became the first dean of the School of Veterinary Medicine.

The Golden Anniversary and dedication ceremony will be held on June 2, 1955, commemorating the 50th year of degree offering of the School of Veterinary Medicine. Following the dedication, the Annual Conference for Veterinarians will be held at the Dykstra Veterinary Hospital on June 3 and 4.

The native limestone, two-story building (See VETERINARY MEDICINE, 50:89 [Feb.], 1955) is situated at the northwest part of the campus and close by other buildings housing the School.

The new building will provide the needed space and facilities for expansion of both the large and small animal clinics. A generous amphitheater, having a seating capacity of 285, occupies the center portion.

Remodeling of the old clinic building is now underway and when completed will provide class rooms and laboratories for the Departments of Pathology and Physiology.

Conference room, biologic display cabinets, store rooms, student lockers, and intern quarters for 10 senior interns and hospital clinicians are on the second floor of the building.

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The Art of Buying

KENNETH B. HAAS, SR., Ed. D., Chicago, Illinois, and KENNETH B. HAAS, JR., D.V.M., Kalamazoo, Michigan

A practitioner may be soundly financed, well-insured and equipped with good bookkeeping records, and yet suffer losses and even failure for lack of good buying sense. This is knowledge of when to buy and what to buy at the right price.

While buying is slowly becoming more scientific, it remains largely an art. The veterinarian should be a "good trader" and something of a shrewd merchant. It is important that he possess a "trading" instinct.

To these ends, no practitioner can afford to be discourteous to salesmen. He should see every salesman's goods, if only for the educational value. If one salesman in five shows something of value, the time spent would return a profit.

One of the best sources of information for the veterinarian is the salesmen. Actually most salesmen are traveling educators. When they are treated with tact and consideration they can give the practitioner many valuable hints and facts. "All that I know about buying," says one veterinarian, "I learned from salesmen."

The veterinarian should know the best sources of supply for the goods he wants, the best methods of handling these goods, how they are sold, their present prices, terms, discounts, and any other factors which may affect the market and the competition.

The doctor's knowledge of his own practice will include such matters as his financial means, his buying policies, his past buying experience, what is customary, what can be done in case of emergency, his credit, the gross profit he wants, and the expenses of his practice.

He should also know, or have records that show the quantities of goods on hand, goods ordered but not delivered, the amount and kind of seasonal goods on hand, use in the past for the corresponding period, and many other specific factors.

Experience in buying over many years is valuable. But no veterinarian can pretend that his experience is wide enough to make un-

necessary other means of discovering facts. Interviews with salesmen, talks with other practitioners, reading of professional journals and visits to conventions can be made to produce handsome profits.

Too much attention is usually paid to price. This often has proved disastrous. Goods should be bought on quality, past performance, and client needs. The aim should be to secure the lowest price, the most favorable terms, and the most adequate service, consistent with satisfactory quality.

Should a veterinarian buy a larger quantity in order to receive extra discounts or "free" goods? The argument usually advanced in favor of taking advantage of quantity discounts is that the extra value of discounts or free goods will more than offset the costs and disadvantages of a slower rate of turnover.

Actually, statistics show that little in the way of extra profits is to be gained by buying merchandise in uneconomically small quantities.

Buying goods in not too large and not too small quantities is, therefore, a sure method of increasing profit. The purchaser who can take cash discounts is the one to whom real bargains will be offered. A practitioner with a strong cash position and ample bank credit, other things being equal, can secure the best bargains.

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Continuing War on Animal Parasites

In his presentation at the 91st annual meeting of the A.V.M.A. in Seattle (Section on Small Animals)* Dr. E. A. Benbrook, head of the Department of Veterinary Pathology, Iowa State College, Ames, questioned whether the profession is keeping up with the march of science, antiparasitically speaking. Progress in control procedures have been made, but when clinical records and necropsy reports are examined, parasitic populations appear as great as ever. The "enemy" may have been strengthened in some units in spite of major engagements initially thought to be decisive.

The importance of parasitic diseases are well understood, much research work and the expenditure of much money has been rewarded by revealing new species and detailed information about them and those known for many years, methods of diagnosis, and improvements in therapy, yet parasites continue to challenge the best efforts, perpetuate themselves and even show numerical increases year after year.

Doctor Benbrook referred to the criticism by animal owners, with which practitioners are so familiar, who have come to realize the frugality of complete removal or preventing reinfection of most any animal species. Mr. Owner is not convinced the veterinarian does or is able to do anymore than the druggist or kennelman. Hope for parasite control by treatment is held out by advertisements in lay publication which in some instances has placed the practitioner on the defensive. Results of control efforts have not achieved results comparable to the advancement of the science of parasitology.

"It is usually wise, in competitive sport," stated the speaker, "to change the technics of a losing game." He listed four points designed to improve the position of clinician who is intent on aggressive tactics against parasites. They are: (1) Keep up to date on developments in parasite science and practice by studying reports in current veterinary literature, attending professional meetings, and exchanging experiences with others. (2) Do not abandon sound therapeutic meeasures and agents. New methods appear frequently and these should be tried cautiously. (3) Familiarize yourself with the patient's nutritive status. The importance of this point lies in the increasing evidence that parasitic damage is greatest in undernourished patients. (4) One must realize that as complete understanding of life cycles are revealed effective weapons are disclosed which may be more effective at one or another of stages in the parasite's metamorphasis. Furthermore, treatment, even though effective, may be of limited value unless steps are taken to prevent reinfection.

The value of a life cycle approach was explained by example. The speaker referred to the common tapeworm, hookworm, and large ascarid of dogs. Of the tapeworm, *Dipylidium caninum* most prevalent in dogs and cats, flea and biting lice are intermediate host. Proper control of this parasite is based upon: "(1) Administration of an anthelmintic; (2) removal of adult fleas and lice from the patient; (3) destruction of the flea adults, eggs, larva, and pupae in the patient's surroundings, especially sleeping area; (4) burial or burning of feces; (5) periodic examination for evidence of reinfection or presence of intermediate hosts."

Considerate application of well-defined control measures can be expected to be fruitful, even effect eradication of important animal parasites. This would improve the general health of patients, please owners, and discourage those who illegally and ignorantly prescribe a "wormer".

*Proceedings Book, A.V.M.A. 91st Annual Convention, Seattle, Wash., Aug. 23-26, 1954, pp. 247.

The Veterinary Program in Hawaii

Visitors to Hawaii, Paradise of the Pacific, enjoy the many pleasures the Islands afford, come and go without fear of contact with foreign plagues and eat foods of animal origin with confidence. They are not, as a rule, conscious of the fact that a small but well-organized and efficient group of veterinarians daily make a major contribution to assure that residents and visitors enjoy wholesome foods. These things are in addition to serving a small but growing and important livestock industry.

The veterinary group has a local association for exchange of ideas and for post-graduate training and refresher courses. Approximately 12 members conduct a mixed practice, four or five are engaged exclusively in small animal work in the Honolulu area. A number of others devote full time to inspection service and several are on duty with the U. S. Army Veterinary Corps, and the U. S. Air Forces. All are graduates from qualified institutions in the States (referred to as the mainland), approximately half of whom are native Hawaiians.

Dr. Ernest H. Willers, WSC '29, is Territorial Veterinarian, a position comparable to that of state veterinarian. He also directs the Blue Cross Animal Hospital in Honolulu. His offices are located in the Board of Agriculture Building in Honolulu, which include besides office space for professional and clerical staff, laboratory facilities for diagnostic service, blood testing, postmortem examination of small animals and other necessary details. The meat and dairy inspection program is directed from this office.

Quarantine service includes careful inspection and testing of all animals brought to the Islands. Buildings and equipment have been made available for this purpose near docks. All dogs and cats are held in these isolation quarters for 120 days at a cost to owners of 65 cents per day for dogs and 50 cents per day for cats. Approximately 200 dogs and cats are continually in quarantine, each in quarters separated by ten feet of lawn and equipped with shelter and runs. Owners are permitted to visit pets while in confinement.

Outdoor runs, in addition to housing, are provided for large animal imports. Equipment includes squeeze chutes for confinement, taking blood samples, making tuberculin tests, et cetera. As an example of the excellence of the inspection service, it may be added that, notwithstanding continuous sizeable shipments of live hogs for the fresh pork market during recent years, vesicular exanthema was kept out of Island herds.

The type of facilities at quarantine and the organization for the care of all animals is such as to assure good public relations. Fees collected do not cover costs so that some public funds are appropriated for this work. By this thoughtfully planned program carefully executed, the Islands are completely free of rabies. It may be said without fear con-

Roundup time on the Pauwaawaa Ranch, Hawaii.

tradiction that monies spent for these quarantine procedures are wisely expended.

Veterinary service is provided in all sections of the Islands through a system of paid deputyships. Approximately ten veterinary practitioners are employed by the Island government for duties as assigned. These men also conduct private practices or contract with livestock growers for professional service.

The veterinarians of the Islands formed a Farmer's Supply Company which operates in Honolulu and handles the dispensing of veterinary drug supplies. This agency also handles supplies for practitioners only, and thus controls distribution of agents that require professional technics for their administration.—*G. G. Graham, D.V.M.*

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Some of our modern husbandry practices are ideal for the propagation of parasites. Livestock walk, eat, sleep, and have their babies in an environment loaded with worms. When parasites board and room in livestock, they do so at the expense of efficient production, and the producer is the first in a long chain of losers.—*D. C. Boughton, D.V.M.*

Stilbestrol for Lambs

In twelve separate trials, consisting of a total of 318 treated animals of both sexes, whose weights ranged from 20 to 60 lb., stilbestrol was administered by subcutaneous implantation of 12 to 15 mg. pellets. An equal number of animals were held as controls[14].

The authors summarized observations which indicated a significant increase in rate of gain due to stilbestrol treatment, regardless of age, sex, or dietary regime. There was no differences in the rate of gain of wether lambs treated with 12 mg. from those treated with 36 mg. of the synethic estrogen.

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Spiegel, Inc., Chicago 9, Ill., sells burros by mail. Also on sale by Spiegel are goats, dogs, monkeys, raccoons, skunks, hogs and other livestock, poultry, and birds.—*Farm Quarterly.*

[14]Clegg, M. T., *et al.*, A Comparison of the Effect of Stilbestrol on the Growth Response of Lambs of Different Age and Sex. *Jour. Ani. Sci.*, 14:178 (Feb.), 1955.

Hawaiian Veterinarians and their Guests at a Meeting Held in Honolulu, February 11, 1955

Seated (1st row): Rodolfo T. Santeco, Jr., PHIL '51; J. M. Gooch, ISC '44; W. M. Pang, WSC '37; G. H. Murphy (California) ST J '20; C. H. Pals (D. C.) ISC '32; G. H. Hart (California) UP '03; G. G. Graham (Missouri) ISC '08; Y. Yamashiro, ISC '35; Thomas A. Moir (Wisconsin) CAL '27; C. B. Webster, COL '54.

Standing (2nd row): R. F. Cross (Ohio) OSU '46; Lt. Col. H. L. Rubin (California) API '39; Lt. Col. L. C. Tekse, ISC '33; E. H. Willers, WSC, '29; Lt. C. W. Davis, TEX '53; N. Y. Chung, ISC '53; P. T. Nomura, KSC '36; H. H. Furumoto, KSC '50; G. C. Folger, WSC '37; A. R. Glaisyer, TEX '46.

Standing (3rd row): R. S. Nagakura, KSC '46; J. F. Bender, Jr. (Washington) WSC '47; W. T. Nagao, MSC '51; R. R. Harada, MASS '46; Mr. J. L. Kaseburg, meat inspector; W. F. Parker, WSC '38; L. N. Case, COR '08; J. M. Sample, TEX '49; Lt. Col. E. R. Prather, KSC '41; J. M. Hendershot, WSC '40; L. A. Weight, COR '35.

ABSTRACTS OF LITERATURE

Vibriosis of Sheep

Vibrio fetus is the primary cause of infectious abortion in sheep of enzootic significance in the United States. Brucellosis as a cause of abortion is unknown in this country although isolated reports of its occurrence in Europe and Asia have been published. In these cases *Brucella melitenses* was identified. Infections due to Salmonella, Listeria, and Pasteurella also have been reported, but never in enzootic proportions.[11]

Infection in sheep by the *V. fetus* is characterized by occurrence of abortions beginning 30 to 40 days prior to lambing. Abortions continue until shortly after lambing dates of the band, however, losses are reduced as pregnancy advances. Weak lambs may be produced at term but die soon after birth. Percentage of abortions varies from 5% to 70%, usually 10% to 20%. Ewe loss, as a result, is usually light.

Outbreaks strike suddenly with no record of exposure. Epizootiology has not been learned, but the disease appears to be self-limiting, appearing and disappearing within the same year. To illustrate the sporadic nature of the disease, the authors cite history of the small breeding flock of 125 ewes maintained by the Montana Veterinary Research Laboratories. In this flock no infectious abortion occurred from 1930 through 1947. In 1942, there were eight abortions and six stillbirths due to this infection. No additions had been made to the flock. After this experience seven abortions and one of those giving birth to dead lambs were held over and lambed normally in the spring of 1943.

No dependable information is available at this time on immunity. Challenge of previously infected sheep by intravenous inoculation of live organisms proved that infection could be established with ease in either recovered or susceptible ewes.

Positive diagnosis of vibriosis is dependent on identification of organisms from fetal sources or cultures from tissues, stomach contents, heart, blood, liver, or from vaginal discharges. Postmortem lesions are limited to sanguineous edema of the subcutaneous tissue of the abdominal wall and blood-stained fluid in the peritoneal cavity. Occasionally, there may be necrotic spots in the liver. A brownish, vaginal discharge may be observed for a few days after abortion or parturition.

No definite control measures can be recommended in view of lack of understanding the epidemiology and source of transmission of the disease. General sanitary practices, including isolation of aborters until discharges cease, is recommended when practical.

[11]Tunnicliff, E. A., and March, Hadleigh, Vibriosis of Sheep. Proc. book, Am. Vet. Med. Assn., 91st annual meeting, Seattle, Wash., Aug. 23-26, 1955, pp. 106-111.

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Influence of Shade, Cool Water, Rations, and Housing on Summer Gains

During the summers of 1952 and 1953, tests were conducted by California scientists in the Imperial Valley of California to determine the influence of shade, cool water, concentrate-roughage rations, and wire *versus* wooden corrals on gains of beef cattle[12]. Water was cooled from normal temperature averaging 89 F. to 65 F.

Faster gains were recorded when adequate shade (60 sq. ft. per animal) was provided by roofs ten to 12 ft. above ground. Cool water alone gave 0.26 to 0.44 lb. more weight gain per day than uncooled water. A roughage-concentrate ration also produced less heating and faster gains. Wooden corrals reflected and radiated enough heat to reduce daily gains perceptibly below those of animals kept in wire corrals.

Conclusions of the authors were that sufficient additional gains may be realized, by practical methods for making animals comfortable in summer, to be economical; furthermore, that findings suggest the influence such environmental factors may have in influencing experimental work on efficiency of various feedstuffs.

[12]Ittner, N. R., Bond, T. E., and Kelly, C. F., Increasing Summer Gains of Livestock with Cool Water, Concentrate-Roughage, Wire Corrals, and Adequate Shades.—*Jour. An. Sci.*, 13:867 (Nov.), 1954.

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Approximately 20% of the total livestock income in the United States resulted from sales of poultry and poultry products.

BOOK REVIEWS

Books reviewed in this department and any other books, if available, may be obtained by remitting the published price to the Book Department, Veterinary Medicine, Suite 803 Livestock Exchange Building, Kansas City 2, Missouri.

DISEASES TRANSMITTED FROM ANIMALS TO MAN, by *Thomas G. Hull,* Ph.D., Secretary, Council on Scientific Assembly, and 24 contributors. 717 pages, 104 illustrations, 46 tables. 4th ed., Charles C. Thomas, Springfield, Ill., publishers — Price $12.50.

Animals are responsible for transmitting certain diseases of human origin; the infection being acquired from man and passed again back to him. They also are natural hosts for certain diseases to which man is the unnatural host. These zoonoses now number well over 100 separate entities, over 20 of which have been added to the list since the first edition of this book 25 years ago. The following, not included in the first, are discussed in this edition: Listeriosis, the several arthropod-borne encephalitides, Rift Valley fever, contagious ecthyma of sheep, tsutsugamushi disease (mite typhus), lymphocytic choreomeningitis, jungle yellow fever, and coccidiomycosis. In addition, seven new chapters have been added that were not included in the third edition, covering the subjects of Vibrio abortion, vesicular stomatitis, Newcastle disease, regional lymphadenitis, (cat-scratch fever), pseudotuberculosis, hemorrhagic septicemia, and rickettsialpox with a note on epidemic hemorrhagic fever. The chapter on fungus diseases contains new sections on cryptococcosis and nocardia infections.

From its first edition, Hull's Diseases Transmitted from Animals to Man, has enjoyed wide acceptance among veterinarians, physicians, and public health officials. Information contained has been authoritative simply because of the intimate knowledge of each author with his subject. Demand has required rewriting and enlargement that incorporates new found information. The previous (third) edition has been out of stock for three years.

An attempt has been made to present each disease or group of diseases, against a brief historical background, emphasizing epidemiology, prevention and control. No special effort has been made to include pathology, symptoms, or treatment, though such items have not been neglected entirely.

This book contains a wealth of material for veterinarians interested in public relations matters and as source of information for preparation of talks before lay audiences. It emphasizes the veterinarian's obligation to mankind through prevention and control of diseases hazardous from a public health aspect.

The book is a must for reading and reference.

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PATHOLOGY OF THE DOG AND CAT: THE GENITOURINARY SYSTEM WITH CLINICAL CONSIDERATIONS by *Frank Bloom, D.V.M.,* formerly associate, Department of Pathology, New York State University, College of Medicine, Brooklyn, N. Y., 463 pages, 312 illustrations. American Veterinary Publications, Inc., Evanston, Ill., publishers, 1954.—Price $12.

In the preface to this book the author states that the object of the monograph is to present the special pathology of the genitourinary organs of the dog and cat. Text material follows precisely so that the whole describes in detail gross and microscopic anatomy, congenital anomalies, circulatory disturbances, trauma, inflammatory processes, tumors, parasites, and other matters that pertain to the kidney, uterus, bladder and urethra, of the urinary system and the primary and secondary organs and glands of genital system; treating first those of the male, then the female, of the dog and cat.

Text material is profusely illustrated by photographs, both gross and microscopic, largely from the author's collection, giving clarity to descriptions.

This fine treatise is the work of a well qualified veterinary clinican and represents years of study of diseases of small animals and the correlation of accompanying symptoms with lesions.

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There is more opportunity for a farmer to boost his income today than at any time in history.—*Ezra Taft Benson.*